Natural Resource Management in Ghana and its Socio-economic Context

Roger Blench (ed.)

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Preface

The present book emerged from a conference and workshop held in ODI entitled 'Ghana and Zimbabwe: Partnerships and Policies for Improved Natural Resource Management' held at ODI in London on the 26–27th of June 1997. This is turn was funded by the Department for International Development (DFID) as part of the programme 'Partnerships and Policies for Change', managed by ODI for the RNRRS of NRPAD. The papers presented on Zimbabwe were published elsewhere and the chapters of this book are much revised versions of the original presentations. A subvention for the preparation and printing of this book was made available by NRI through the kind intervention of Felicity Proctor at DFID. The workshop was organised by Roger Blench and Stephen Hall and logistics were taken care of by Adrienne Watson, who prepared some of the papers for press. Final preparation of the manuscript was undertaken by Alana Coyle. Acknowledgments are included with individual chapters.

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Acronyms

AET	Agricultural Education and Training
AI	Artificial insemination
ASPCA	American Society for the Prevention of Cruelty to Animals
CEC	Community Environmental Committees
DACC	District Agricultural Coordinating Committee
DEMC	District Environmental Management Committees
EPA	Environmental Protection Agency
ERP	Economic Reform Programme
FINSAP	Financial Sector Adjustment Programme
FWRMP	Forestry and Wildlife Resource Management Project
GCC	Ghana Cotton Company
GCDB	Ghana Cotton Development Board
GIS	Geographical Information System
IITA	International Institute for Tropical Agriculture
IPRs	Intellectual Property Rights
LPA	Land Planning Area
MIS	Management Information System
MOFA	Ministry of Forestry and Agriculture
NAES	Nyankpala Agricultural Experimental Station
NBFI	Non-Banking Financial Institution
NGO	Non-Governmental Organisation
NORRIP	Northern Region Rural Integrated Development Program
NR	Northern Region
NR	Northern Region of Ghana
PDL	Plantations Development Limited
RFO	Regional Forestry Officer
RMFI	Rural and Micro-Finance Institution
RNR	Renewable Natural Resources
ROSCA	Rotating Savings and Credit Associations
SARI	Savannah Agriculture Research Institute
UER	Upper East Region
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UWR	Upper West Region
WFI	Wenchi Farm Institute

Introduction

Ghana is one of the better-researched West African countries in terms of its natural resources. Since the 1920s, active Departments of Agriculture and Forestry have both undertaken and encouraged research into all aspects of natural resource management and this tradition continues up to the present, albeit in a more collaborative mode than in the colonial era. Part of the impetus for such detailed studies has been the severe problems of erosion and land degradation and consequent chronic food deficits, especially in the North. There is a strong tradition of interaction between research and action; Northern Ghana has been the focus of numerous development projects and shelters a surprisingly large number of NGOs.

It is common to imagine that the pattern of research in the past was very different from today, with colonial officers in solar topis striding across farms making notes on clip-boards and pounding out reports on ancient manual typewriters. Modern-day researchers sit ensconced in a room in Tamale or Bolgatanga, air thrumming with a fan while the laptop computer clicks away and the ink dries up in the printer. The researchers are students, NGO or government officers often reaching remote or less remote villages on motor-bikes or bicycles. Present-day research is almost always conducted by visitors to the region, hence the tendency for the same limited set of villages to be worked and reworked both by NGOs conducting PRAs and more academic study projects. Indeed, it says much for the good nature of the people in the villages that they are willing to put with this barrage of intrusive questioning.

The geographical pattern of research reflects both accessibility and the relationship with the relief industry. Upper West Region, with its low population density and yam-based farming system, is barely covered in this book, reflecting the more general absence of research in this region. The focus was on the semi-arid areas of the north, but several chapters also encompass data from Brong-Ahafo in the 'transition zone' and Coastal Zone Management is also described.

The chapter by Jones *et al.* provides a useful summary of the overall contribution of Renewable Natural Resources (RNR) to the economy and to rural livelihoods. Ghana remains a largely rural economy, where the majority of the population gains its livelihood from natural resources. Some 80% of poor households live in rural areas where 77% are farmers and 84% are self-employed (ADB, 1994). Households with female heads are some 30% of the total in these areas. The contributions of different sub-sectors within the rural economy have stayed much the same between 1990 and 1995, with crops/livestock contributing 70.4%, cocoa 14.6%, forestry/logging 11.4% and fishing 3.6% in 1995 (ISSER, 1996).

The opening chapter by Steve Wiggins derives from a large-scale literature review of the situation of farmers in West Africa and the prospects and constraints on agricultural growth. It has the advantage of

synthesising both the Francophone and Anglophone literature and of providing a wide-ranging bibliography covering recent studies of West African farming. Wiggins observes:

> 'even if agricultural development in much of rural West Africa has seen as much disappointment as success, it is, however, not clear that deterioration in rural incomes and welfare has been widespread.'

Wiggins emphasises the relatively conservative nature of West African farmers, especially in relation to technical innovation and notes that technologically-driven change has not been central to economic development. He emphasises that this is because it is not accompanied by corresponding social and economic changes. Thus, tractors are introduced, used for a few years while they are cheap enough, and then discarded when they break down. The cropping system then reverts to the pre-mechanised cultivation pattern. However, since the fields have usually been destumped to facilitate tractor cultivation, their fertility is generally lower, or else the household has lost the benefit of the useful trees formerly in the field. Similarly with mechanical pumps or other types of irrigation. If neither the culture nor the educational system support a maintenance culture necessary to keep these innovations functioning, then their introduction will not be sustainable in the long-term.

Wiggins draws attention to a long-running debate, which is important although not much aired in the present book, farmers' natural resource management. Historically, there is a literature of pessimism going back to the 1920s, of deforestation, erosion, declining soil fertility attributed to mismanagement. The response from the end of the 1980s onwards, has been 'counter-narratives' that emphasise rather indigenous management and claim that erosion and degradation are nothing like so severe as has been alleged and that rates of deforestation have been grossly exaggerated. This dialectic can never be resolved and each individual will situate themselves on a continuum reflecting their own experience. The visible degradation of Upper East Region in Ghana makes it difficult to dismiss soil degradation as a myth or to assert that indigenous technologies have always come to the rescue. The disappearance of the high forest in many regions over the last quarter century makes it hard to accept that deforestation is entirely fictional. Nonetheless, in some areas, notably the Sahel, panic-stricken writing about degradation was simply based on a very incomplete understanding of the resilience of the soils and vegetation and these criticisms are justly made.

The chapter by Roger Blench is an attempt to understand the pattern of agricultural production and its links with household structure and labour availability. Northern Ghana has had a long history of intensive research into agriculture and related problems and considerable efforts at practical development. From the 1920s to the 1950s, there were studies and

extension projects initiated by the colonial agricultural department, whereas after Independence the impetus came more from projects funded by multi-lateral donor agencies working through the agriculture department. More recently, there has been an dramatic growth of NGOs in the region designing and implementing a variety of projects. Northern Ghana presents marked demographic contrasts: between the high-density populations of Upper East Region (UER), the medium settlement of Northern Region (NR) and the extremely low densities encountered through most of Upper West. In terms of both existing projects and chronic food deficits, UER and NR were considered the highest priority, and the survey was therefore designed to contrast these two regions, with particular emphasis on socio-economic constraints on production and their impact on the environment.

A major finding of the study was that the UER in particular is locked into a cycle of under-production, because of high population densities and consequent labour migration. UER and NR contrast markedly in relation to their socio-political arrangements. The Dagomba area around Tamale is the centre of a relatively powerful, centralised chiefdom with a generally low population density where swidden cultivation is still possible in bush areas away from the towns. UER is dominated by acephalous peoples with a very high population density and consequently, continuous cultivation in many regions. However, this system operates largely without any intensification; mechanisation, HYVs and inputs are in short supply. The consequence is chronic food deficits and a high level of labour migration. Labour migration preferentially affects young men, whose investment in soil and water conservation would be essential to making the region productive (as are comparable areas in West Africa). As a consequence there are continuing relief operations and a high density of NGOs.

Stephen Hall's study is intended to complement the comparative study of agricultural systems described in the previous chapter. Again comparing the high-density areas around Bolgatanga with those around Tamale, but exploring the more specific field of animal production, a number of interesting contrasts emerge. The cattle in Northern Ghana are, unusually, largely West African shorthorn types with varying amounts of zebu admixture. It seems that the animals in the high-density Upper East Region show less introgression of zebu genes, compared with the Tamale area. This is because the major use of cattle in the Upper East is for traction and slaughter at funerary ceremonies. The cattle are often kept either stall-fed or close to the homestead and rarely mix with pastoral herds. By contrast, among the Dagomba, many animals are kept in herds in the bush and have more chance to mate with zebu. Tamale cattle are measurably larger in size as indeed are the other ruminants, sheep and goats. They are, moreover kept in much larger herds. Hall concludes:

> 'Environmental conservation and development of savanna woodland will tend to be favoured by trends towards intensification of livestock production because intensification will reduce dependence on common pool resources; trends towards extensification will be harmful. Investment in livestock production should be targeted in such a way that extensification is discouraged.'

Further south, in the 'transition zone' (Brong-Ahafo) Kofi Marfo and Steve Wiggins explore the issue of intensification in relation to market access. The relatively low population of the Wenchi area has made it a traditional supplier of produce to large regional markets such as Kumasi. Although originally on the edge of the forest, anthropic factors have made the vegetation effectively more similar to savannah with consequent effects on cropping patterns. Cocoa, plantain and cocoyam have virtually been eliminated, while cassava, maize and vegetables (tomato and garden egg) have everywhere expanded. The case study was intended to compare market access and population density and it shows very clearly that market access in itself can induce intensification irrespective of population density. It would be interesting to know to what extent this is a reflection of the 'market' culture of West Africa. Trading is accorded such a high cultural value that making it easier simply acts to release pent-up desire, especially where low population densities and acceptable rainfall mean that food security is not an issue.

Turning to designated cash crops, Colin Poulton discusses a particular aspect of agriculture in Northern Ghana, the cotton sector. As elsewhere in West Africa, cotton was dominated until recently by a large parastatal, Ghana Cotton Company Ltd (GCC), which not only bought cotton but supplied farmers with inputs and credit until the harvest. Where farmers are worried by food security, they tend to divert inputs to increasing food production thereby causing low yields of cotton and thus 'strategic default', i.e. the value of their cotton is insufficient to repay the loan. However, liberalisation of the sector has led to the growth of competing companies and there were some twelve in 1996–7. This has had a significant effect in improving timeliness of inputs and quality of seed; lint production has correspondingly increased. Nonetheless, returns to labour for growing maize are significantly higher than for cotton and some farmers continue to take this option, especially as they are not penalised financially if their cotton harvest does not cover the cost of inputs. The only sanction the cotton companies have is to blacklist the farmer. As a result, cotton production within Ghana is not as profitable or effective as it should be; Poulton contrasts this with the situation in Sindh Province, Pakistan, where provision of credit for inputs has created a substantial increase in output, based on much closer relations between traders and farmers and more effective sanctions for defaulting farmers.

The chapter by Michael Warner and his collaborators is an attempt to give some historical time-depth to changes in the farming system of the Western Dagomba people. We are fortunate to possess a detailed study of agricultural practice from 1957 conducted by Akenhead (1957). By comparing the results of their survey in 1994–5 they are able to give a perspective on changes over that period. The most significant seem to be:

a) Maize cultivation may well be at similar levels as the pre-Independence era, but the cultivation of sorghum and millet has declined. Cassava has replaced yams as the principal tuber crop in high-density areas.
b) Use of all agricultural inputs is at very low levels, now that they are only available on the open market.
c) The majority of farmers still depend on saved seed and traditional varieties of almost all crops.
d) despite shortening fallow periods, few farmers have adopted significant intensification strategies.

Such a pattern challenges much of the evolutionary rhetoric that all too often dominates this type of literature. Once farmers are convinced of the virtue of fertiliser, so the argument goes, they will continue to use it, even when they must pay market prices. Once they have seen the yield increases of improved maize, they will adopt it and the market will take over the supply. In reality, of course, markets are very imperfect mechanisms when they are so dependent on a transport system dominated by the vagaries of imported vehicles. Farmers too have cash-flow problems; while there is no doubt they are convinced of the virtues of fertiliser, they may not be able to raise the sums needed at the right time of year.

John Kirby's paper is intentionally somewhat different in tone and content from most of the other papers in this book. The economistic outlook fashionable among donors and those who commission research often means that culture is usually relegated to footnote. Northern Ghana has been a long-term field of study for social anthropologists, and indeed some of the seminal monographs of the discipline relate to this region (e.g. Fortes, 1945, 1949). But developers are made uneasy by ethnolinguistic diversity, so they have by and large chosen to ignore the writings of anthropologists. This has been made easier by the sometimes idiosyncratic choice of topics on which anthropology has historically been focused. In the case of Fortes, how much do you really want to know about Tallensi kinship systems? Probably not two books' worth, especially when the whole business of getting a living is compressed into a short article. Searching the whole of ethnographic writing about West Africa prior to the 1960s for material on the relations between society and the environment would produce a meagre harvest.

The other aspect of anthropology which tends to irritate developers is that it remains fixed in the 'ethnographic present'. Developers like to feel

they are dynamic and that the societies they work with are on the threshold of a great change that will transform their lives. Empirically, it is true that dramatic changes have affected, somewhat patchily, many areas of Ghanaian life, though regrettably, not in the area of food security. But the almost conscious archaism of much anthropological writing hardly seems to inform current experience.

This somewhat lengthy excursus is intended to introduce John Kirby's paper. An earlier version of this was published in the 1980s (Kirby 1987) and it has been updated for this volume. Kirby's main argument was that the 'bush' was conceptualised in an extremely negative way in the thinking of the Anufo, who live at Chereponi on the Ghana/Togo border. Their overt argument, that closed landscapes allowed enemies to approach more nearly, may be just a gloss on a more widespread sentiment that the bush is not a rich resource to be managed sustainably, but an encroaching force to be fought. The practical consequence of this was that the Anufo were enthusiastic setters of bush-fires and took every opportunity both to chop down trees and slash at seedlings. Tree-planting and anti-erosion projects had thus been a complete failure. As a result, the area immediately around Chereponi was a wasteland without trees and marked by severe soil erosion.[1] Kirby's original paper in the mid-1980s prophesied imminent ecological disaster in somewhat apocalyptic tones. Obviously more than a decade later, Chereponi has not been wiped from the map but remains a region beset by chronic food deficits. The overall point, however, remains. We cannot assume that forest resources have the same cultural importance for different ethnolinguistic groups or that people will come to accept 'green' value, which are, after all, only newly fashionable in our own culture.

The value of a common notion that a remedy for falling productivity is improved through training of farmers is examined in Kevin Waldie's account of Wenchi Farm Institute (WFI). Conceived originally in terms of strengthening technology development and dissemination, it rapidly became clear that the focus should rather be on developing institutional capacity. Intake has been falling for some years, and the whole institution suffered from the common malaise of similar sites across Sub-Saharan Africa, under-investment leading to crumbling infrastructure and consequent lack of attraction to potential students. More importantly, the lands of the institute itself were exhausted, perhaps leading students to conclude that the techniques they were to learn produced no better result

1. There is an burgeoning literature on indigenous soil and water conservation in Africa, but its promoters have thoughtfully skirted round areas like Chereponi.

than their own home farms. The official goals of WFI were set out by the Ministry as follows:

- to help increase general farm production through the training of boys and girls in modern methods of farming
- to train students in basic mechanisation skills
- to improve the general education and sense of responsibilities of the students through various extra curricula activities
- to develop and demonstrate improved agricultural techniques through adult farmer training programmes.

Few of these goals are now met, and in particular, some institutional changes have occurred that make them very problematic. Waldie observes that although girls were admitted in the earlier stages of the WFI's history, it has long since become an all-male institution. Although originally there were programmes of interaction with local farmers, now there are none. Finally, the goal of teaching mechanisation has been somewhat vitiated by the absence of a working tractor.

Similar case-histories are common enough in Sub-Saharan Africa and perhaps need not be underlined. However, the question remains; how can AET (Agricultural Education And Training) then be established with any hope of sustainability? Waldie argues that any 'institution-centred' approach is bound to be flawed. In other words, WFI or hundreds of other similar institutes cannot be fixed up by simply manipulating the organogram. What is needed is a much more radical 'client-centred' approach, or put more simply, starting from the farmer and bringing in all the various players in the local area. Waldi describes the forum established through this approach, the District Agricultural Coordinating Committee which 'quickly took on a life of its own and started to push and pull the project into a new supporting role'. Waldie cautions that although WFI has now been transformed by long-term investment, notably from DFID, questions remain over its sustainability; if the flow of funds dries up will the same institutional paralysis return? Again these are questions that are asked all over Africa, and receive a range of answers. Sometimes such new institutional arrangements fall apart again, elsewhere they thrive. The sociology of institutions is not yet sufficiently developed to be sure we know the answer in any particular case.

The watchword of some chapters in this volume is 'participatory' and they describe the detail of participatory research. Nonetheless, it is sometimes surprising how similar the pleas of researchers are across the decades. Here is Vigne (1936) writing of the value of community woodland:

> 'The main value of savannah forest is the supply of firewood, timber and grazing and minor products such as thatch, fruits etc. and the

> ideal would be to have numerous small reserves, accessible to every settlement, owned by the local people and worked on a simple scheme of management, with their goodwill.'

Early 'schedules' of Reservation are indeed remarkable for their sensitivity to the Forest Reserve as a multi-purpose resource, where communities could graze stock, cut thatch and building poles, retain access to their shrines and gather non-timber products. A Reserve constituted under 'bylaws' could encompass an agreement that allowed for all these local factors to be taken into account.

In a rather different ecological zone, the work of Gina Porter and her collaborators in the coastal zone of Ghana demonstrates a rather hi-tech approach to participatory management schemes. The main problems experienced in this region are coastal and gully erosion, pollution, deforestation and overfishing. Responsibility for environmental management has been devolved to District Environmental Management Committees (DEMCs) as part of Ghana's broader commitment to decentralisation, a process begun in 1988. As may be imagined, it is easier to create such committees by fiat than to provide them with the resources and skills to function effectively. The project described has collected a great deal of information on environmental issues and local economic patterns as well as undertaking substantial archive work, resulting in what is described as a 'participatory' database. But, as the discussion makes clear, it is easier to get people to participate in the process of collecting data than in the more painful process of maintaining and expanding the database, as well as making it a usable resource. Making appropriate hardware and software is a problem, and finding the resources for training and paying officers to continue making use of the database, given the immediate funding problems appears to be problematic. This situation will no doubt be familiar from many other projects in different ecological zones.

The study by Fergus Lyon of traders and marketing in central Ghana covers some of the same territory as Marfo and Wiggins, except that it is angled towards the traders, or financial intermediaries. Brong-Ahafo is important in supplying vegetables to urban markets and Lyon documents an important shift from monocropped large-scale cultures, notably cocoa, to a much more diversified small-scale market gardening. The cocoa bushes were destroyed by very wide-ranging bush-fires in 1982–3 and this diversification can be partly interpreted as a strategy to avert risk and partly because re-investing in cocoa is a long-term strategy and it may be that fewer farmers are willing to make that investment. Traders typically have a bad reputation in the literature as dishonest and manipulative as well as occasionally making large 'windfall' profits. As Lyon shows, this stereotype is a very partial picture; fluctuations in profit margins are essential to a trader's overall cash-flow. Although farmers sometimes come together to strengthen their bargaining position, this really only works in

times of scarcity when many traders are seeking limited produce. In times of surplus, farmers tend to break ranks and sell for reduced prices, partly because of the plethora of villages.

Traders, on the other hand have very strong group who function socially as well as simply as an economic association. Both collective decisions on market prices and credit are thus easier to enforce. These structures derive both from traditional concepts of chieftaincy and more modern ideas of cooperatives and are a great deal more democratic than any of the institutions of government. They are, at least in the case of Kumasi, essentially controlled by women, although the secretary who keeps the records is usually a man. Lyon makes the crucial point that:

> 'It must also be recognised that many of the institutions are not evolving to minimise their transaction costs alone but the agents involved are using their greater power in the market to maintain their position.'

In other words, the cost of cohesion is that the associations become socio-political rather than strictly financial in character and that they then discard the concept of increasing profit and market effectiveness in favour of the social advantage of individuals.

Howard Jones and his collaborators take a step back from the ground, as it were, and consider the broader role of financial intermediation in revitalising the rural sector. African economies are well-known for their thriving informal sector, often in contrast to a sclerotic banking sector. Ghana is no exception to this rule, or to the problem that, despite financial sector reform, credit and other services do not appear to have improved in rural areas. One response to this has been to try and encourage Non-Banking Financial Institutions (NBFIs) such as credit unions or NGOs. The importance of this can be illustrated by the Ghanaian cocoa crop, which generates ¢175 billion per annum, hardly any of which finds its way to the banks. To explore this in more detail, case studies were undertaken in the South: Winneba, Sunyani and Yeji, illustrating coastal fishing, agriculture and forestry, and inland fishing. The surveys indicate that there is a strong need for different types of credit, often quite small-scale and although partly seasonal and related to productive activities, also with a strong unpredictable element. Although these needs are met by informal local institutions, transaction costs are high and an unwillingness to lend represents a constraint on some types of loan. The survey showed, that apart from NGOs with a specific brief, lending to the RNR sector was not ranked highly as a loan preference in either the formal or informal sector. The preference was rather for personal loans to individuals with a salary; presumably this reflects the relative ease of recovery of a loan, job security acting as collateral. Jones et al. give the example of an Agricultural Bank, 92% of whose loans went to such individuals and only 5% of which were

disbursed for agricultural purposes in 1995. Two suggestions are put forward to try and alter this perceived imbalance:

a) strengthening institutions that manage group finance. Banks are much more willing to lend to formally constituted groups

b) strengthening linkages between the formal and informal financial sectors

There is little doubt that a more effective banking and credit sector is crucial to growth in rural areas. The question is, can this be somehow developed through projects, or is it something that must evolve naturally?

Ghana remains a relatively dynamic country in the West African context and an openness and willingness to consider and try out new institutional structures certainly ranks as an advantage in developing the flexibility necessary to surviving in the world economy in the next century. Nonetheless, Ghana continues to be slowed by the persistence of fossilised institutions that draw resources from the economy without any perceptible return. Studies again and again emphasise the dynamism of the informal sector as against the lethargy of larger structures. Only strategies that can bring the two together and form some sort of creative synergy have any chance of success.

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1
Setting the Scene: Recent Change in West African Farming and Natural Resource Management[1]

Steve Wiggins

Introduction

This chapter draws on insights gained from reviewing case studies of change in rural West Africa at district and village levels from the early 1970s to the early 1990s (see Wiggins and Gadbois, 1995) and the parallel work of the Club du Sahel (Snrech, 1995). The attempt to synthesise from case studies responds to a frustration with analyses which depend heavily on national agricultural statistics which are probably inaccurate and may also underestimate farm output.[2]

This previous work is used here to draw out the main changes taking place in agriculture, issues in natural resource management and some policy implications.

Changes in West African farming since the early 1970s

West Africa[3] in 1991 had a total population of 197m. people, of which 67 m.

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2. Official statistics tend to concentrate on the main crops and those which are marketed through formal channels (and often through ports and capitals). They are weaker for minor crops, those consumed within the village economy, and for those marketed within local and regional circuits.

3. West Africa here is limited to those mainland countries lying between Nigeria-Niger in the east and Senegal in the west.

lived in the region's towns and cities. Farming is the main rural activity, with perhaps 13 m. farming families[4] cultivating 55 m. ha of arable and permanent crops in the fourteen countries considered here. The large majority of these households tend smallholdings, most using hand tools, with little application of purchased inputs such as manufactured fertiliser. Only small areas are irrigated. Yields per unit area tend to be low and are at the mercy of the weather. Livestock are similarly raised with low inputs of all factors other than labour, and they generate low outputs. Large-scale farms are unusual in West Africa, even for exported tree crops such as cocoa, coffee and oil palm.

Given the importance of agriculture in the economy as a whole – for export earnings, and for rural jobs and welfare in the region – attempts by government to stimulate expanded and intensified farming have a long history, and have been particularly vigorous since WWII. Even if the policies chosen have not always been wise, to put it mildly, the intention has been clear. Yet results have been meager.

There have certainly been some remarkable booms in cash-cropping (see Tosh, 1980) – witness, for example, the expansion of cocoa farming in southern Ghana in the early decades of this century, or the very recent burst of growth in cotton production in the Francophone countries – but the overall picture is of slow growth. Indeed, official statistics reported to the FAO suggest that between 1961 and 1991 agricultural production failed to match population growth in ten of fourteen West African countries.

If, however, farm output is compared to the rural population growth over the same period, in only five countries did agricultural output lag behind. It seems, then, that the failure of West African farming has been to supply provisions to the cities, rather than the villages (a point observed by Jaeger (1992) for Sub-Saharan Africa as a whole). This has not, however, meant less availability of food: imports have generally increased sufficiently to raise estimated food supplies ahead of population growth.[5] The food crisis in West Africa has been more one of draining scarce foreign exchange than of food shortage.

Intensification of farming has been patchy. Yields per unit area have often stagnated or even fallen, the latter occurring as soil fertility has

4. Assuming 80 per cent of rural inhabitants are crop farmers (as opposed to pastoralists, artisans, etc.), and that household sizes average 8 persons.

5. In the early 1960s eight large West African countries (Burkina Faso, Côte d'Ivoire, Ghana, Guinée, Mali, Niger, Nigeria, Sénégal) imported just 393 kt of cereals, less than 4 kt of milk powder, and 4 kt of meats: by the early 1980s these figures had risen to 3,378 kt of cereals, 79 kt of milk powder, and 48 kt of meat – according to FAO data.

declined from reduced fallowing. Although fertiliser use has increased markedly, especially in Nigeria, it has been from a very low base so that still little fertiliser is applied to most crops.[6] The exceptions tend to be cotton and maize where input packages have been provided through public agencies and large companies. Other purchased inputs such as crop protection chemicals are used both rarely and sparingly. Few West African fields are irrigated[7], those that are irrigated are watered primarily by small-scale methods. Tractors and other powered machinery are equally unusual. West African farming remains largely a process of hard labour applied to the land, with nature being a key arbiter of harvests.

If, then, relatively rapid growth of farm output has been patchy and sporadic in the region, it raises the question of what is responsible when rapid growth does occur. Four sets of factors are worth discussion: population, migration and labour supply; output price, markets and transport; access to liquid capital, input supplies and risk; and technical innovations.

Population, migration and labour supply

Despite the drift to the cities, which have grown at rates in excess of 5 per cent a year, rural population has been increasing at approximately 2.1 to 2.2 per cent per year since the early 1960s. Thus, there were approximately 90 per cent more people living in rural West Africa in 1991 compared to 1961. As village populations have risen so has the demand for land to farm. Where possible, cultivated areas have been increased – and, since historically only a few areas have been closely settled[8] – it has usually been possible to do this. To some extent this has been achieved by clearing land previously in pasture, bush and forest, but it seems that most expansion

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6. During 1971–3 West Africa consumed just 87 kt of manufactured fertiliser, a figure that rose to 528 kt in 1989–91 – 402 kt of this in Nigeria. But this still gives an average annual application of just 9.6 kg/ha, and omitting Nigeria, a rate of 5.5 kg/ha per year. (FAOSTAT data)

7. 1.4 m. ha of the 55 m. ha arable land was estimated to be irrigated in 1989–91.

8. Excluding the immediate peripheries of cities and towns, the only substantial rural areas settled at more than 100 people per km^2 are southern Nigeria, southern Ghana, the region around Kano, the Mossi plateau, the groundnut basin and the hinterland of Dakar in Sénégal and The Gambia.

has taken place by reducing the length of fallows.[9] This expansion has been assisted in some cases by using animal draught to help prepare land, although most other field operations have remained manual even when animal draught has been available. Expanded farming has thus demanded more labour.

Permanent or long-term temporary migration out of rural areas has deprived some regions of farm labour whilst permitting rapid expansion of farming in receiving areas. Good examples are the Upper East region of Ghana which has lost men to the south of the country, and the Mossi plateau of Burkina Faso which has exported large numbers of workers to farms in the Côte d'Ivoire. The additional labour in the forest zones of Ghana and Côte d'Ivoire has allowed rapid development of cocoa, oil palm and other crops in pioneer zones. Where and when young men have migrated out of the villages, much of the additional load has fallen on the backs of women, the aged, and children making it difficult to intensify cultivation. The seasonal absence of men is one reason why village irrigation 'perimeters' in the Sénégal valley are cropped once and not twice a year.

Whilst migration to towns and cities is well-observed, rural-rural movements have been less noted, despite their magnitude. Coastal countries have generally received migrants from the Sahel. Settlement into the guinea savannah zone is continuing, especially since success in controlling blackfly has within the last decade lifted the threat of river blindness from some 25 m. ha of land (McMillan and Meltzer, 1996). Rural-rural migrations can lead to rapid increases in farm output in the newly-settled areas. For example, in the Sourou valley of south central Mali since about 1990 6,000 ha have been opened to flooded rice production, partly due to the efforts of migrants from the Dogon plateau and the inland delta of the Niger to the north (Woodhouse *et al.*, 1997).

Output prices, markets and transport

The single biggest stimulant to farming has been the possibility of selling farm produce at attractive prices. Earlier during this century, the main

9. The case studies repeatedly report expansion of fields, yet national data (reported by FAO – FAOSTAT) on land use show remarkably small increases in the area deemed 'arable and permanent' over the last 30 years – annual increments of less than 1 per cent per year are typical. From 1961–3 to 1989–91 this area may have increased by just 19 per cent – up from 46 m. ha to 55 m. ha for the fourteen countries alluded to in note 3.

stimuli were the prices of exported crops responding to demand in the industrialised countries. Cocoa, coffee, groundnut and palm-oil are good examples. Production of these has been much affected by the vagaries of world markets. Depression in the industrialised countries, competition from supplies from other parts of the world, and substitution of raw materials with consequent reduced demand for the originals have all led to slumps in prices of export crops at one time or another. In some cases the effect has been to all but eliminate a once-thriving commodity market, as happened for example with groundnuts in northern Nigeria in the 1970s (Mortimore, 1989).

More recently, market stimuli have tended to emerge within the region. In addition to the urban demand for staple foods, some high value produce, especially vegetables, fruits and milk, have been demanded in quantities giving rise to localised bursts of growth in areas with suitable land and water and speedy access to market. Only the recent boom in cotton production, almost all exported, in the francophone countries bucks this trend.

Price incentives only act when it is possible to reach the market. In a large region with relatively few tarred roads, getting to market can be difficult and expensive for many farming households. Porter (1994; 1996) describes how, on the Jos plateau since the mid 1980s, reduced government spending on road maintenance, rising prices for trucks and spares, and reduced subsidies on diesel can plunge farmlands once with reasonable access into effective isolation. Where formerly truckers would venture a dozen or more kilometres down a dirt track to pick up a load, the traders cannot now afford the cost and risk of breakdown, remain on the tarmac and farmers are thus obliged to head-load produce over large distances.

The economic environment can have a huge effect on farm-gate prices. The ravages of overvalued exchange rates and liberal food import policies during the 1970s in many countries, to say nothing of the depredations of some monopolistic marketing boards raking a surplus off farmer prices, notably depressed the prices of both export and food crops. Subsequently in the 1980s devaluation and liberalisation of marketing, often part of structural adjustment programmes, have corrected some of the worst distortions. In the case of Nigeria, bans on the import of various cereals since 1979 has led to considerable expansion of maize and wheat production in the centre and north of the country.

Given their potential and observed impacts, it is not surprising that the effects of population growth and market access, either singly or in combination, have attracted comment. Snrech (1995) sees intensification of farming as responding to these two factors as shown in Table 1.

Table 1: Market access and pressure on natural resources

	Poor or risky access to market:	Strong access to market:
Weak pressure on natural resources:	Extensive crop production, or emigration, livestock important	Large-scale mechanised farming, capital-intensive (e.g. cotton pioneer zones)
Strong pressure on natural resources :	Subsistence production, labour intensive, low returns, strong emigration	Intensification by labour or capital, depending on the pre-existing conditions

Source: Snrech, 1995

This summary is useful: it highlights the diversity of agricultural circumstances, even without taking into account the bewildering variety of ecosystems within which farming takes place. It also goes some way towards explaining the patterns observed. Clearly in this model, market access is a *sine qua non* for intensified farm production which both raises local incomes and contributes to national objectives. It does not, however, explain the variations seen between zones of similar geography of population density and market access, or between different households within any given zone. For example, over the last ten or more years the guinea savannahs of the northern Côte d'Ivoire and central Nigeria have become areas of strong in-migration with associated increases in maize and cotton production. Yet the same zone within northern Ghana has seen far less settlement and far smaller increases in marketed farm output, a puzzling contrast.

It may still be true that for many farm households in the region, intensification of farming is unnecessary, land is not scarce and market possibilities are limited – as in the top-left quadrant of Snrech's scheme. Hence it makes sense to farm to meet subsistence requirements by extensive cultivation, and devote remaining work time to other activities. But this applies to a shrinking number of households: rural population growth means that ever fewer households can practice shifting cultivation, and throughout much of the region fallow periods are being reduced. Moreover, in some areas market access is good enough to make production of a surplus attractive. For many households intensification has become either necessary to maintain output per person or lucrative. As seen earlier, in areas of strong out-migration labour shortages can limit intensification. But outside of these zones other factors must come into play.

Access to liquid capital, input supplies and risk

Economists are predisposed to imagine that where the pull of the market is strong, then investments will be made. This does, however, assume that factor and input markets work reasonably well.

Rural credit markets are notably incomplete and imperfect. What loans are provided come mainly from family and friends for dealing with immediate consumption and emergencies. Very little credit reaches the countryside through banks and the like: the transactions costs are just too high.[10] Hence farmers often face a liquidity limitation: they simply cannot finance the buying of fertiliser, the rental of machinery, or the hiring of extra labour.

Moreover, in some, perhaps most, areas private dealers are reluctant to stock seeds, fertilisers and other inputs (Reardon *et al.*, 1997 in Burkina Faso, personal communication, northern Ghana 1997). They face high transactions costs[11] and, no doubt with some reason, suspect the demand for these is low.

Risk completes the trinity of factors causing under-investment in farming. If the weather is unkind or market prices fail, investments in inputs can prove a costly waste of scarce cash. Insurance against such risk is simply unavailable for the vast majority of households.

Proof that these factors have a significant impact on the use of purchased inputs and services comes from those cases where companies, sometimes public, have provided a package of inputs on credit. The most notable cases come from the cotton zones of the francophone countries where cotton processing and marketing enterprises derived from the old CFDT[12] deliver tractor services, seed, fertiliser and sprays and deduct the costs of these from payments when the harvest is delivered. The result has been an

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10. These are mainly the costs of information about the creditworthiness of borrowers. Making loans to unknown borrowers is risky: Berry (1997) reports on how cocoa farmers in Ashanti used to borrow from a rural bank, sell their cocoa through relatives, and claim crop failure as a excuse not to repay. Not surprisingly, after a few years the bank ceased to grant loans to cocoa farmers.

11. In this case the information problem is largely that of estimating demand: for seed, in particular, this can be hard to judge. Markets in rural West Africa are often spectacular in the range and variety of goods on offer, even in up-country backwaters. There seems to be no lack of traders or entrepreneurship when the demand exists and is known to exist.

12. Compagnie Française de Développement des Textiles (CFDT) originally worked throughout Francophone West Africa and was subsequently split into nationalised components.

extraordinary expansion of cotton farming in the guinea savannah that has seen production quintuple since the 1970s.

It seems, then, that these are conditioning factors. Where expanded or intensified farming demands substantial cash investments and involves significant risks, or both, responses to market attractions or population pressure will be muted – unless there are institutional arrangements which alleviate these constraints.

Technical innovations and knowledge

Intensification and expansion of farming require suitable techniques. It is difficult to judge to what extent lack of them has stymied agricultural development, since the counter-factual is difficult to conceptualise. That said, the literature suggests that technical knowledge is usually neither a barrier to intensified farming nor the prime stimulus to intensification. When opportunities arise, farmers seem able to access technical innovations that satisfy their needs – even if the techniques are less than optimal. Often as not, innovations are learned or acquired from other farmers. For example, when it became possible in the early 1990s to grow rice in the Sourou valley of Mali (Woodhouse *et al.* 1997), cultivators obtained flood rice seed from the Inland Delta and oxen-and-ploughs from the nearby plains. Sometimes the innovations are those unsuccessfully promoted earlier by public agencies, but which come into their own with some change in markets – as has happened with animal traction in some areas.

There are few stories where the motor force of change is a technical innovation. On the other hand there are plenty of cases where techniques have been introduced from outside with little success – for example, the repeated attempts to install pump irrigation on The Gambia river (Carney and Watts, 1990) – especially where such techniques have been intended to effect dramatic transformations of the farming system. Indeed, a notable feature of technical change is that much of what has been seen has been incremental: new crops are tended within existing land use systems (e.g. cotton), old crops receive fertiliser, field tilling is mechanised, dry-season irrigation water once lifted by *shadufs* is pumped up by diesel engines, etc. By and large, new ways of farming are fitted into existing patterns of farming, access to land, and household organisation – or else the innovations facilitate some change in the latter factors. But root and branch

transformations are remarkable for their near absence, and most attempts to bring them about have ended in failure.[13]

This is not to decry efforts to improve technology. Improving current methods may not cause radical change in the farming system, but by reducing costs or raising output may have considerable benefits to cultivators and society as a whole. No, the point is rather that it is hard to argue that lack of technical knowledge prevents expansion or intensification of farming in many cases.

One final point about the farm economy: even if agricultural development in much of rural West Africa has seen as much disappointment as success, it is, however, not clear that deterioration in rural incomes and welfare has been widespread – although that has almost certainly occurred in some places. Even in those areas that have seen too little growth in the farm economy, the ability to earn livelihoods locally outside farming, and the possibilities of migration, have apparently underwritten the survival of rural economies and societies.[14]

Natural resource management

Since the series of droughts in the Sahel between 1968 and 1973, West Africa has been seen as an archetype of environmental degradation, particularly prone to loss of forest, soil erosion and desertification.[15] Many, if not most, parts of the region have seen appreciable changes in land use over the last quarter century or more. Soils may also have changed in quality. Yet on closer examination what is happening to the West African environment is neither as clear – in severity, reversibility, costs of outcomes or in detailed process – nor as certain as some reports suggest.[16]

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13. For example, some of the large irrigation schemes in northern Nigeria (Adams, 1991) or the failure of Bud Senegal and its commercial vegetable estates (Mackintosh, 1989). Indeed, it is quite hard to identify more than a few cases of truly large-scale, capitalised farming in the region: Firestone's rubber plantations in Liberia and the Senegalese sugar company at Richard Toll would be two exceptions (Chaléard 1996).

14. Cases of resilience in villages in areas of low potential for farming – the drier areas usually – can be found in Mortimore (1989) for northern Nigeria and in Savadogo *et al.* (1995) for the Sahel of Burkina Faso. In the drier areas migration can be crucial. However, Bryceson (1996), when contemplating sectoral change in Africa as a whole, suggests that diversification of livelihoods may not be an unalloyed blessing in as much as it impedes specialisation and skilling of labour.

15. See Franke and Chasin (1980), Sinclair and Fryxell (1985) and Timberlake (1988).

16. Most environmentalists agree on the uncertainty surrounding ecological change. That has been admitted, indeed stressed, for many of the world's pressing

Counter-narratives from detailed case studies have recently surfaced to challenge the dramatic assertions of serious and irreversible decline. For example, a detailed study of 'desertification' in northern Nigeria came to agnostic conclusions about what is happening and its severity (Mortimore, 1989). Others question whether the savannah is expanding owing to forest clearance (Fairhead and Leach (1995) studying Kissidougou, Guinée), or whether its extent is pretty much what it has been for the last few hundred years. Doubt has been cast on the importance of woodlands in the Sahel: some trees are useful and valued by locals, many are not (McClintock (1993) in Tivouane, Sénégal).

That said, there is one critical environmental problem about which there seems little scientific doubt[17], and which farmers readily recognise.[18] A trend since 1950 or so towards lower rainfall, shortened rainy seasons and more variability of rain in the late season affects much of semi-arid West Africa and parts of the humid zone as well (Nicholson and Palau, 1993). Farmers have responded by changing the crops and varieties they plant, favouring shorter-season varieties that escape the vagaries of the end of the rains. For many Sahelian farmers adapting to lower rainfall appears to be the critical natural resource challenge.

The other salient resource issue seen by farmers is coping with declining soil fertility consequent on reducing fallow lengths. Responses are various,

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environmental concerns – global warming, loss of biodiversity, etc. Curiously 'desertification', West Africa's particular contribution to the international environmental agenda, has proved the exception in so much as desertification is frequently described as proven fact with well-understood processes. In fact it seems there is far less evidence than might be thought – see Swift (1996) and Stiles (1995) for a reaffirmation of the conventional wisdom.

17. Evidence for desiccation during the last half century based on recorded rainfall looks strong. The main uncertainty surrounds the extent to which this is part of a cycle or is a trend. Climatologists have yet to agree on what is causing desiccation, but earlier arguments which focused on local origins such as forest clearance are in doubt. More recent work looks to changes in ocean temperatures and in global climatic phenomena, such as the El Niño-Southern Oscillation (ENSO). It would be ironic if the main environmental problem of West Africa had its origins in, say, global warming after so much has been written suggesting that West Africans have unwittingly damaged their environment by their own actions in 'over' grazing, clearing forests, expanding the tilled area, etc. Quite why desiccation for which there is strong evidence has not attracted the same publicity as alleged desertification for which the evidence is far weaker is an interesting question.

18. A study of Manya Krobo, southern Ghana, more farmers claimed their soils to be good and desiccation to be their problem than those who complained of infertility or degraded soils (Amanor, 1994).

reflecting localised factors, but one point is clear: effort will only be put into maintaining fertility where there are clear returns to doing so that justify the expenditure of scarce resources (Reardon, 1995). In some cases, outsiders concerned about soil fertility decline have proposed solutions that have overstated the benefits compared to the effort involved. For some households it makes more sense to seek incomes in the wider economy than to break backs spreading manure, digging in green manure crops and collected leaves, composting, etc., the returns on which may be marginal when rainfall frequently fails and when markets are remote.

What policy issues arise?

Where does this discussion leave the concerned outsider, be they government officer, NGO coordinator, or aid agency functionary?

To take Reardon's point first: some of the more pressing resource management issues are unlikely to be tackled unless farming prospers. As argued, it seems that without access to markets, not much will happen on the farms. But access to markets, whilst necessary, is not sufficient. Labour shortages can affect the outcome but, even more commonly, so too can the trinity of limits imposed by lack of liquid capital, input availability and risk. Technical innovations will surely follow, if and when needed.

If we are interested in improving farm productivity, then to what extent do markets and access (demand) or investment-inputs-risk (supply) bind? How do these factors trade off against one another? What conditions make one or other factor most exigent? And at what point do other constraints such as labour shortage and lack of technical ideas bind? To provide a generalised answer to these questions would require some extraordinarily fine modelling of farm households. For practical policy, in any one locality it should, however, be possible to arrive at working conclusions from careful observation and enquiry – assisted by a keen awareness of the ways in which the four sets of factors discussed operate.[19]

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19. Isn't this what countless earlier project-identification missions have done, and if so why has policy not been better informed? One answer is practical that policy-makers and their advisors usually have an agenda. The farming systems team of the agricultural research service, for example, is loath to admit that there is not much scope for farm innovations whilst the study area is cut off from markets at critical times in the year thanks to the poor state of access tracks. The overwhelming temptation is to mention this in the report and then to pass swiftly on to a consideration of what might be done in research and to consequent conclusions as though the roads problem were solved by their mere mention. Even where analysts are disinterested, they are reluctant

Beyond trying to make farming more prosperous and attractive, specific measures for natural resource management need to be tailored to local circumstances. Given the high diversity of natural resources, decentralised action under local control is more likely to set sensible objectives and adopt appropriate means than actions planned from the top down.[20] Outsiders thus need to support and facilitate local initiatives. For many this represents the clearest conventional wisdom of natural resource management. But two important caveats apply.

First, earning livelihoods for some rural West Africans involves more territory than their own farms or the village lands, since they seasonally migrate to other places to work or move their grazing animals over large areas. As Painter *et al.* (1994) point out, the current vogue in the Francophone Sahel for *aménagement-gestion de terroir* through village self-management may thus miss the point for some households.

Second, if the evils of dirigisme, urban bias and negative protection of farming by an overweening and less-than-competent state are clear, so now are the failings of minimal governance and *laissé-faire* markets – anyone who has bumped down a pot-holed road bereft of maintenance knows this. Government has a role in providing public goods, ameliorating market failure, arbitrating property rights, etc. – as indeed do some 'third sector' bodies. Moreover, despite the pessimism surrounding public activity, the record shows that government can do some (quite big) things reasonably well: clearing blackfly (McMillan and Meltzer, 1996), building and maintaining roads, promoting some simplified farming systems and associated food chains (*filières*) where appropriate and rewarding (Bingen at al. (1995) on cotton in southern Mali), and agricultural research and extension (Smith *et al.* (1993) on the maize boom in northern Nigeria) – are all good examples of things that work.

The challenge, then, is to integrate the best elements of well-known agricultural and rural development programmes with awareness of local and temporal specificity and needs of differing social groups to sustain and improve their livelihoods.[21] There is the danger, however, that

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to conclude that there is little to be done in the current circumstances. The temptation is to recommend action even when conditions are unpromising.

20. A counter instance would be the OMVS, magnificently deciding on stream flows in the Sénégal with scarcely a nod in the direction of the thousands of farmers who appreciate floods more than they enjoy steady flows.

21. Snrech (1995) points out that sustainability does not necessarily occur at all scales, times, and in its social, economic and ecological dimensions simultaneously. Instead rural households may pass from one state of disequilibrium to another as they successively respond to problems.

untrammelled decentralised actions will lead to a hotchpotch of diverse small-scale efforts uninformed by wider strategic concerns. There is thus a role for public planning, unfashionable as it may be, along the lines suggested by the Club du Sahel's long-term perspective study.

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2
Agriculture and the Environment in Northeastern Ghana: a Comparison of High and Medium Population Density Areas

Roger Blench

Background

Northern Ghana has had a long history of intensive research into agriculture and related problems and considerable efforts at practical development. From the 1920s to the 1950s, this took the form of studies and extension projects initiated by the colonial agricultural department. In the post-Independence years, the impetus came more from projects funded by multi-lateral donor agencies working through the agriculture department. More recently, there has been an dramatic growth of NGOs in the region designing and implementing a variety of projects. However, the dry season of 1997–8 saw some of the worst food deficits ever recorded in the northeast, suggesting that the combination of biophysical features and structural realities is destined to overcome the best efforts of developers, no matter how numerous.

For this reason, it seemed useful to return to basics; to try and understand the pattern of agricultural production and its links with household structure and labour availability. Northern Ghana presents marked demographic contrasts: between the high-density populations of Upper East Region (UER), the medium settlement of Northern Region (NR) and the extremely low densities encountered through most of Upper West. In terms of both existing projects and chronic food deficits, UER and NR were considered the highest priority, and the survey was therefore designed to contrast these two regions. Map 1 shows Ghana as a whole with the survey area shaded.

This chapter[1] contrasts the agricultural systems in areas of high-density settlement in the north-east and the lower-density areas around the north-central regions of north-eastern Ghana with particular emphasis on socio-economic constraints on production and their impact on the environment. It describes the differing systems of landholding and production that have significant effects both on relative poverty and the environment. It focuses on attitudes and strategies in relation to common property resources. As far possible, reference is made to previous writing on the topics discussed, but the text is based on current fieldwork and does not represent a summary of earlier work except when explicitly stated.[2]

Survey background and methodology

A baseline socio-economic survey was conducted in Upper East Region and the Tamale area of Northern Region of Ghana in February and March 1997. There were two principal elements, surveys of villages and of individual households. Village surveys were intended to capture qualitative aspects of agricultural and environmental institutions associated with village. The sample sizes are shown in Table 1:

Table 1. Sample sizes of socio-economic survey

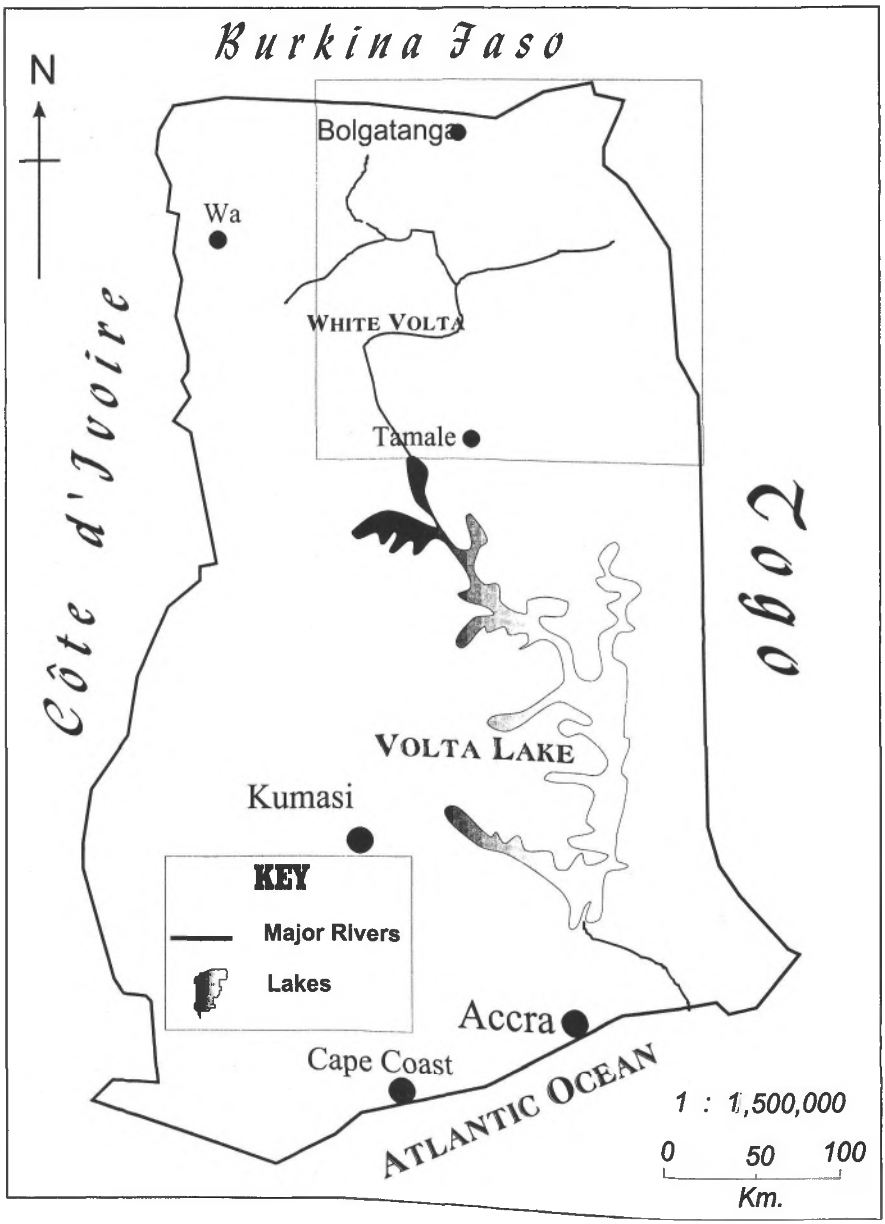
Villages Surveyed	42
Sacred Groves	179
Total Households surveyed	529
Northern	222
Upper East	307

1. Research was conducted in N.E. Ghana from 10/2/97 to 18/3/97 and from 10/1/98 to 21/2/98 following a preliminary visit in June 1996. The research was funded by the Department for International Development (DFID) as part of the programme 'Partnerships and Policies for Change', managed by ODI for the RNRRS of NRPAD. The research was conducted under a memorandum of understanding with the Forestry Department with the practical support of Planning Branch, Kumasi and the RFOs in Tamale and Bolgatanga.

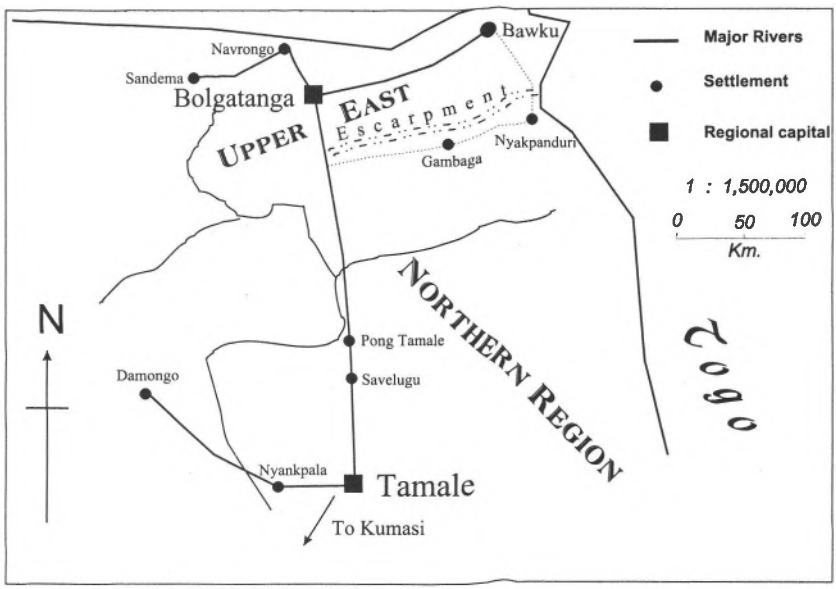
2. The present chapter is a cut-down and updated version of a much longer report presented to DFID in 1997 entitled 'Agriculture and the environment in northeastern Ghana: a comparison of high and medium population density areas'. The original report should be consulted for a more comprehensive bibliography as well as discussion of many issues in greater detail.

Coverage was intended to reflect ecology, settlement and human population density, as well as ecological and ethnolinguistic diversity. The survey area is shaded in Map 1 while Map 2 shows the region in greater detail.

Map 1. The survey area in Northern Ghana



Map 2. The survey area in detail



The broader goal of the survey is to provide background socio-economic data to assist in the planning process relating to savannah woodland management, especially in the light of the upcoming Forestry and Wildlife Resource Management Project.[34]

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3. I should like to thank the Forestry Department, in particular the Chief Conservator of Forests, Mr. E.O. Nsenkyire, who both eased the initial process of arranging the MOU and took time to discuss the preliminary survey results. Mr. Adam Abu has been encouraging at every stage of the survey and has assisted practically with logistical support. The survey could not have been carried out without the practical support of Planning Branch, Kumasi and its late Director, Dr. B. Aninakwa. I should like to thank Keith Dolman of the Forest Sector Development Project for smoothing the path of the survey in many ways and Jane Gronow for discussions and assistance with documentation. The RFOs in Tamale and Bolgatanga at the time, Mr. Oppong Sasu and Mr. Winfred Bimah did everything in their power to ease the survey in their area. Mr. Peter Howard, IUCN, kindly supplied documents relating to the wildlife element of FWRMP.

4. The present writer was invited to attend a planning workshop in Kumasi on the 17th of February to discuss the submission of the SWM documentation. A preliminary

Ecological background

The survey area varies between subhumid and semi-arid in terms of climatic regime. The mean annual temperatures are ca. 25° and the annual rainfall some 1000–1500 mm in the Tamale area falling to 700–1200 mm in Upper East. Donhauser *et al.* (1994:7) report a mean annual rainfall for Nyankpala, west of Tamale, of 1019 mm for the period 1980–90. The rain falls in a six-month season from April to September. Rainfall can be very patchily distributed and farmers often plant seeds two or three times before the rains set in reliably.

The two regions have a contrastive geology; the UER is underlain by granites interspersed with some pyroclastic rock while the NR is essentially Voltaian sandstones, giving easily worked light soils but prone to concretions and hardpan (Runge-Metzger and Diehl 1993). The granites have both a greater concentration of nutrients and better retention of precipitation. The ochrosols which form on top it are less prone to erosion than the sandy soils forming on the sandstones. Valley bottoms concentrate hydromorphic soils and cultivation of both rice and other horticultural crops is possible.

Actual soil fertility is determined as much by the exceptional concentrations of population allied with a low-input farming system. Throughout most of UER, except in the extreme west, there are virtually no elements of the system that encourage the return of nutrients to the soil. Livestock roam freely in the dry season, but in the dry season they are taken away from the area to avoid damage to crops and the manure is effectively lost. Most trees, even leguminous ones, have been removed from the farms in order to increase cropping area. Firewood is so short that the stems of cereals are removed from the farms and used to cook food, thus not returning their organic matter. The elimination of almost all types of ground cover leaves the area prone to wind erosion. Within the lower density areas of NR, many of these problems have been avoided. The underlying hardpan makes root development of cereals more problematic and the higher density of trees requires considerably greater labour inputs, but soil fertility is usually not considered a problem, except in the high-density areas west of Tamale.

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version of this paper was presented to the Conference 'Ghana and Zimbabwe: Partnerships and Policies for Improved Natural Resource Management' held at ODI in London on the 26–27th of June 1997. I am grateful to the participants at that meeting for many useful comments.

The usual description of the vegetation is Guinea savannah in the NR, grading into Sudan savanna in the semi-arid region of the UER. The dominant tree species are locust ('dawadawa') (*Parkia biglobosa*), shea (*Vitellaria paradoxa*) and kapok (*Ceiba pentandra*) with a ground cover of perennial grasses such as *Andropogon gayanus*. Further north, the baobab (*Adansonia digitata*) and whitethorn (*Faidherbia albida*) become to predominate.

However, much of the area is an example of an extreme anthropogenic landscape. The natural tree fauna has been severely depleted; in much of the UER almost every species except *Parkia* and *Vitellaria* has been systematically eliminated from the farming areas (Hunter 1967b; see also Kessler 1992 for a description of a similar pattern in neighbouring Burkina Faso). The bush fires that are set every year reduce all the large trees so that even in remote areas, the vegetation may consist of young trees.

Ethnolinguistic diversity and social structure

Northern Ghana is highly diverse ethnolinguistically, with at least twenty-five languages spoken in the region surveyed (Barker 1984). Television broadcasts are put out in Dagbani and Gurni, and six or more languages are used on the radio. Although literacy materials have been prepared in many of these languages, usually through the agency of bible translators, reading is not yet widespread enough for these to be major vehicles of agricultural extension or information dissemination. There is no *lingua franca* that serves as an effective medium of intercommunication although a type of Hausa is often used as a market speech in large towns. This diversity reflects the acephalous social structure characteristic of many peoples of the region.

The underlying social structure is the extended patrilineal family. Families form part of lineages and these in turn compose clans (Manoukian 1952; Norton 1987 and references therein). There is, however, a major contrast between two types of social organisation, between the acephalous populations living in dispersed settlements and hierarchical societies with elaborate chiefly structures (Fortes 1945; Hunter 1967b). In the precolonial period these societies established hegemony over the acephalous populations, initially through the use of cavalry and later guns. These polities are often known in the literature as the 'Mossi-Dagomba states' and they probably originated further north in present-day Burkina Faso with the Mõõre (Mossi) state in the thirteenth century. Within Ghana the most important of them were the Mamprusi, Dagomba and Nanumba.

The effect of this was to place rulers from these states over acephalous peoples such as the Tallensi, Nankani, Kusaal and Konkomba. Although these states were nominally Islamic (in the case of Dagbon) or incorporated Muslim ritual into the kingship ceremonial (as in Mamprusi) they did not convert their subject populations or even make major changes to the social order but based the states on the exaction of taxes. The British colonial system tended to conserve this system (as it did in Northern Nigeria) as it made it possible to administer the region with a minimum of officials. Despite a general move to weaken the power of chiefs at Independence, Mampruli-speaking chiefs remained in place through much of UER into the 1990s. Since 1990, they have gradually been replaced by indigenous chiefs. The underlying structural ambivalence of the situation has been responsible for considerable tension throughout the region over the last decades and has contributed to regular outbreaks of inter-communal violence.

In the acephalous societies, such power as there was resided in the elders and in particular in the earth-priests or *tendaana*s who were the guardians of the land, 'landlords' in Ghanaian parlance. There seem originally to have been no secular chiefs. With the establishment of the state-systems, chiefs were appointed in parallel with the *tendaana*s creating a system of dual authority. In the heartland of the states, especially in Dagomba, the chiefs were invested with considerable ritual authority and this has been maintained until the present. In the acephalous areas, the chiefs were much less able to exercise authority, partly because of the dispersed settlement patterns and because there were no traditions of respecting such individuals. Among the Dagomba, the earth-priest's position was gradually absorbed into the authority structure and his responsibilities became more structured. Further north, there are many more landlords, many more shrines and the spiritual authority of any individual is more diffuse.

A recent development has been the rise in power of the 'Assemblyman'. The growth of the District Assembly system has meant that every substantial community sends a representative to the District Assemblies. These individuals are elected and are usually English-speakers and so create a link with the larger national infrastructure. Despite the common term, they are sometimes female, especially in communities nearer the road. Assemblymen are often the channel for linking NGOs with villages and have thus become a third pole of power in many communities.

The 'community' is a typical focus of both analysis and the usual target for development strategies. It is believed to be a coherent unit, both in terms of possessing a body of knowledge and the ability to make enforceable decisions. This may be a reasonable assumption as far north as

the Mampruli area, but north of the Gambaga escarpment, such entities are at best elusive. Chiefs are nominal, as extended families inhabit dispersed compounds and not coherent settlements and are effectively bound only by the religious sanctions adhering to their clan.

The extended family, which may live in compounds of up to 100 individuals, is also not a coherent decision-making unit, since many of its most important members, economically, do not usually live there. Younger and middle-aged males have often migrated to the south, either to work for cash or farm and the well-being of those left behind depends on their effectiveness. Major decisions taken in their absence are therefore not considered binding. Neither government nor the NGOs have yet recognised the problems of working with such a fragmented and structurally unfamiliar situation.

Households are characteristically dominated by older males, even though they are often run in practice by the wives of the middle-aged males who control everyday decisions. The mean age of household heads very high, driven up by what were almost certainly estimated ages for very old men. At the other end of the scale, some small households with very young heads were recorded, especially in the Dagomba area:

Mean age of interviewees	50.7 years
Range	17–105

The social-structural differences between Northern Region and Upper East, expressed through the contrast between chief-centred, village-based structures and the acephalous societies based on dispersed compounds show up clearly in the differences between the regions. Table 2 shows the overall means for household size and structure in the survey area and then breaks them down by Region.

Table 2. Size and structure of households in NE Ghana

	Overall		Northern	Upper East
n Households	529		222	307
	Mean	Range		
Mean household size	20.5	1–120	21.7	19.7
Wives	2.2	0–16	1.7	2.5
Children	9.3	0–80	8.9	9.5
Migrants	3.4	0–74	0.5	5.4

Mean household size if very large compared with most standard surveys of this area. This is because the definition of household used varies from one survey to another. It is common to take a small sub-unit of the large compounds in UER and analyse that as if it were a household. This has the effect of making the household look similar to those recorded elsewhere in Ghana but also distorts the underlying social structure which has very large households as cooperativeperative units.

The difference between the two Regions does not at first sight appear to be very marked but this is because household size refers to residents. When migrants are added to the totals then the mean household size in UER is markedly larger than in NR. Migrant labour patterns confirm anecdotal statements in the literature; the UER is the major exporter of labour to the south. Dagomba households are almost all in regions of low population density and there is no necessity to send members south to earn cash to feed the residual household. The mean number of wives per household is higher in UER because Islamic practice among the Dagomba tends to restrict individuals to four wives. In the traditional areas, there is no such restriction and older household heads often have numerous wives.

The reasons for the contrasting demography of the two regions have been the source of much reflection but no very convincing hypothesis has been advanced to explain it. Hilton (1960b) plotted successive census figures on a series of maps and they show not only the striking density in UER but that its rate of growth is faster than other regions. No simple climatic or soil model is relevant, since much of Upper West is part of the same physiographic system and it has some of the lowest population densities in Ghana. The roots may therefore be sociological and relate to the powerful hold the lineage system still has over individuals. Throughout much of Africa, a typical response to severe deterioration in agricultural production is for whole subsections of the community to split off and form a new settlement in a lower-density zone. Such settlements gradually break their economic and ritual links with the base community and become an independent unit. This does not occur in UER, where households retain an intense relationship with their original territory. Although subsistence means that the household usually has to be split, the personnel involved in this are quite fluid. The death of an elder means that those in the south may be recalled to take over their position managing the ritual cycle. Anecdotal evidence suggests that few who are called in this way refuse to return. The consequence is that populations continue to rise.

Labour migration and its consequences

The relative wealth of the forest zone in terms of gold-mining, timber and cocoa have created an important magnet for surplus labour in the savannas ever since the 1920s onwards when cheap transport made possible seasonal migration (Hilton 1961; Hunter 1965). A pattern developed of young males travelling south towards the goldfields and cocoa plantations of the south of Ghana. The usual strategy was to return for the wet season and assist with farmwork. Cash wages were attractive as they allowed unmarried men to accumulate capital to buy cattle essential for marriage and, later in the life-cycle, for sacrifice at funerals. Indeed the wealth of southern Ghana was such that labourers also migrated from neighbouring Francophone countries, a drawing off of resources that accounts for the rather aggrieved tone of some of the literature (Le Moal 1960).

Another aspect of migration, however, was that it took pressure off food and other resources in areas where the human population density was high. There were less mouths to feed in the hungry season and the migrants sent back cash which could be used to buy food. As pressure on the land has increased this element has become of major structural importance in household strategies. In contrast to patrilineal systems elsewhere it is the eldest sons who are sent away and the youngest son was maintained in the household to stand in for the father.

Initially a seasonal migration, this movement of Northerners to the south took on increasing aspects of permanence. Northerners found posts in the civil service, began to run businesses and to marry and establish households in the south. This created an important support network for 'new' southerners coming to the south from any given ethnic group. The consequence was that in reality, split households were established with a constant flow of individuals between the two. However, the notion that sons returned to work on the farm in the rainy season was strongly maintained for sentimental reasons even though it is manifestly false. Even today it is frequently presented to outsiders and is widely believed by non-northerners.

Another important aspect of the myths around northern migrants is that since the object was to accumulate cash, there was no involvement with farming. Indeed it was said that land could not be obtained in areas further south due to hostility of local populations. This too is no longer true and the Kusase have established whole communities in Brong-Ahafo producing surplus food which they send home to their families in the Bawku area as a version of food aid. It is striking, however, that they do not simply split the community and form a new independent economic unit in another location. They still regard themselves as part of the lineage located in the

Kusase homeland. The overt reason given for this is that this is where ancestral shrines are located and that these cannot be transplanted.

Land tenure

The land tenure systems of Northern Ghana have been described by numerous authors (Pogucki 1950; Bening 1976; Benneh 1973, 1976). There is also an extensive legal literature summarised in Abdulai (1986) but since this generally has a very limited impact on the ground it is not explored further here.

There are two elements in understanding tenure systems in this region:

- the division between farm and bush
- the independence of trees from the land on which they grow

Until this century the principal method of farming was shifting cultivation; villages moved within a demarcated zone, clearing the woodland, farming for some years and moving on. Allocation of lands in bush farms was through the earth priests, *tendaana*, but the abundance of land was such that competition for land was almost absent. Trees in the bush and preserved on farms were the property of the chief or earth-priest and could only be harvested or cut with their permission.

Farms were divided by classes according to their productivity. Home farms and those in valleys or along rivers farms were the most valuable and could be cultivated continuously, while the bush farm was cultivated with a bush fallow system. Such land is held by the village/lineage and cannot be alienated (Benneh 1973). Ownership of economic trees on farms has devolved to the individual who develops the land but the ownership of economic trees in the bush has now become a matter of dispute in some areas. In the Dagomba area, the chief and his assistants still try to enforce controls on the exploitation of these trees, but elsewhere, especially in UER, these have effectively collapsed. The first individual to reach a tree can harvest its fruit.

These land tenure systems have been generally maintained up to the present. Although land is bought and sold around larger urban settlements such as Bolgatanga, intense pressure on land in rural areas has not yet led to a monetarisation and individualisation of land rights as has been reported elsewhere in West Africa. Instead it has resulted in a consolidation of lineage holdings and a sharpening of boundaries. This unusual situation seems to reflect the continuing importance of traditional religion and the maintenance of lineage solidarity combined with the

realisation that an individualisation of landholdings will rapidly lead to social and economic stratification.

A consequence has been that the principle, that a developer of the land develops tenure rights, does not operate in the high-density areas. Land can be loaned to 'strangers' with the assent of the earth-priest, but even long residence does not usually mean the permanent acquisition of land rights. As a result, it is near impossible to accumulate large, consolidated landholdings, except in the lower-density areas near Tamale.

Large-scale mechanised farming can be fairly said to have had no impact in this region. There have been occasional experimental farms, attached to research stations but they have had no impact on the region as a whole. The one exception to this is the production of rice in low-lying areas associated with the White Volta (Konings 1981). The acquisition of such large holdings ran contrary to traditional land tenure procedures where farmers have rights in land worked in the immediate environs of the village. To obtain the written registration of landholdings necessary to guarantee bank loans, complex political manoeuvring was required. This tended to skew the balance strongly in favour of the literate members of the community. This in turn created considerable resentment, with the consequence that resentments were worked out by burning the rice farms, a common phenomenon in the 1970s and 1980s (Goody 1980).

Land use planning: genesis and evolution

The particular problems of the granite areas of northern Ghana have been recognised since the 1930s and the notion that population and land use planning was the appropriate response go back at least to Lynn (1937, 1942). Lynn argued that a combination of:

- already high population densities
- fragmentation of holdings
- uncertain rainfall
- uncontrolled livestock movement
- low-yielding crop varieties
- lack of inputs
- lack of anti-erosion measures

meant that economies of scale were not operative and that the unsustainability of agriculture could only increase. The end-process of his work was the North Mamprusi Forestry Conference of 1947, where a series

of Forest Reserves were established in selected areas along the main watersheds. With additional funding and technical advice from the IDC, these were established as Land Planning Areas (LPAs) (Hilton 1959).

Some success were recorded in controlling burning and grazing, the construction of contour terraces and small check-dams. However, the immediate recommendations were that a large proportion of the human population of some LPAs would need to be moved. In the case of the Frafra resettlement area this was estimated at some 80,000 individuals (Hilton 1960a). It was felt that this could be achieved through extension ('Mass Education' and 'organised propaganda' in the language of the period). In the event this was almost a complete failure and numbers have continued to rise in UER (e.g. Hunter 1965, 1967a). In part this was because the colonial concept of this region as a labour reserve for the south was simultaneously maintained and indeed has been persisted into modern times.

Land use planning has been largely based on a concept of policing rather than working with communities to manage land and forest resources. Attitudes are changing, both in the NGO sector and in official policy (Alebikiya 1993; Ashie Kotey 1992). Importantly as well, the rise of substantial internal migration within this region is leading to increased communal conflict. There is an accelerating *local* demand for land allocation and consolidation of private and communal resources which almost certainly did not exist previously.

Agricultural systems

Research

The tradition of agricultural research in Northern Ghana goes back to the colonial agricultural service in whose annual reports are found many useful descriptive materials on both cropping and woodland management. The monograph-length description by Lynn (1937) of agriculture in North Mamprusi remains a standard reference, while a valuable summary of agricultural research up to 1962 is 'Agriculture and land use in Ghana' (Wills 1962). The location of these institutions in the high forest zone tended to preferentially disadvantage the savanna regions, but this was partly remedied by the establishment of Nyankpala Research Station (now SARI, the Savanna Agricultural Research Institute). Originally funded by GTZ, it has now been entirely handed over to the Ghanaian government. Its brief has been to research savanna agriculture, and the concentration

has been on crops, rather than livestock or woodland. There is a substantial body of research on the savanna farming systems in the Tamale area, especially around the research station itself, which is in a rather uncharacteristically high density farming area including (Diehl & Runge-Metzger 1985; Hailu & Runge-Metzger 1993; Donhauser, Baur and Langyintuo 1994).

Research in UER has been more patchy, since it has been largely conducted through the work of individual researchers. Tripp (1978) describes the agricultural systems in the Navrongo area and Benneh (1972, 1973) describes aspects of agriculture for Sissala villages west of Navrongo. For the Bawku area, Chilalah (1957) and Collins (1960) describe the agricultural extension work undertaken in the colonial era, Cleveland (1980) discusses household composition an demography in relation to agricultural systems and Webber (1990, 1996) gives a valuable account of agricultural change between 1979 and 1993.

Rainfed systems

Variable population densities are reflected in the cultivation systems distributed across the region. Until recently, shifting cultivation seems to have been dominant in much of the low-density area east of Tamale. It is still quite common in parts of Upper West. More recently, bush-fallow systems have become predominant as owners invest in construction and transport infrastructure requires that villages be sited along roads. Strikingly, however, some areas of UER have shifted to permanent cultivation. The farming system in UER is based around dwarf millets, cucurbits and pulses which would normally be encountered in lower rainfall zones elsewhere (Coull 1929). Cultigen diversity is low, probably a response to poor soil fertility. Animal traction is extensively used, but not to throw up ridges that could improve rooting and counteract erosion (Panin 1986). Further south, yams become more dominant in the system, which reflects both the value of mounding in counteracting subsoil hardpan, but also the large southern market. Yams reflect important cultural values through much of the south but in reality most farming populations have been forced to switch to cassava due to lowered soil fertility.

Irrigation

Early records of agriculture suggest that all types of irrigation or flood-retreat agriculture were virtually unknown in the pre-colonial era. These labour-intensive production systems were probably inappropriate for populations which depended heavily on gathered produce and rainfed swidden agriculture. A factor that may have acted as a discouragement is the presence of river-blindness (onchocerciasis) along all the major water-courses. This has caused populations to retreat from the most fertile areas and subsequently to return to them once a health equilibrium has been established (Hunter 1966; Patterson 1978).

However, the pressure on land and the need to produce cash crops for sale has gradually brought about innovative farming techniques. It seems quite likely that Muslim migrants such as the Zarma and the Hausa were the first to practise horticulture in riparian areas. Many of the larger rivers are still not exploited in this way for lack of adequate methods of lifting water.[5] However, most shallow rivers and seasonally flooded land is now given over to dry-season gardening, especially in UER. In addition, where 'dugouts' (small dams for trapping water for both humans and livestock in the dry season) have been excavated, gardens are sometimes established on their edges. Onion cultivation is particularly popular and probably represents one of the most important agricultural exports form the region. Along the River Tongo, west of Navrongo, a series of small dams has allowed most of the river banks to be developed for flood retreat gardens.

The spread of flood-retreat cultivation in the decades since 1960 is one of the factors of agricultural change that contradicts the rather gloomy prognostications given in the opening quotes. Its impact is, however, patchy, depending on the proximity of appropriate terrain and a market infrastructure adequate to export surplus products. It undoubtedly has the additional benefit of improving the diet of the producers and providing work for adult males who might otherwise be forced to migrate. There is still an opportunity to develop some of the larger rivers for irrigation, given appropriate water-lifting technology.

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5. In other neighbouring countries, such as Nigeria, small petrol pumps were introduced by Agricultural Development Projects to lift water to gardens and these are still widely used despite being no longer subsidised. It may be that the technology has so far failed to transfer to this region or that the transport infrastructure to bring horticultural products to market is too weak for their use to be economic.

Crops

The basis of the cropping system throughout UER is pearl millet. There are two groups of millet cultivars, a short-season millet harvested in July and a long-season millet, harvested in November or December. The dominance of millet in such a high rainfall area is striking as millet is usually associated with subdesertic regions. The early millet is interplanted either with late millet or sorghum in fields close to the compound where fertility is highest. The further fields are planted with sorghum intercropped with pulses, especially cowpeas and occasionally groundnuts.

Maize underwent a burst of popularity during the period when fertilisers were available at subsidised rates. However, hardly any farmers reported planting it in 1997 since no fertilisers were available and soil fertility, if anything, has declined still further. Rice (*Oryza sativa* not African rice) is planted in swampy lowlands and there are small pockets of fonio along the Togolese border.

Although often characterised as a quintessentially humid-zone crop, the Guinea yam is of major importance throughout much of NR. The Dagomba recognise more than thirty different cultivars and the Vagla, who live in the far west of NR a similar number. Cassava, cocoyams and sweet potatoes are cultivated in small plots, usually in riverine areas. The 'Frafra potato' (*Plectranthus esculentus*) was formerly extremely common in the Bolgatanga area, but now has bee displaced by Irish potatoes.

Two marked changes have occurred in the cultigen repertoire in recent times; the spread of 'European' vegetables with the gradual disappearance of some minor indigenous crops and the increased interest in planting fruit trees. Carrots, cabbage, lettuce, peas and brinjals are all now readily available in larger market towns. They are grown in irrigated plots close to towns and were probably originally planted for expatriates. However, they have now infiltrated local diets to quite a significant level. The disappearance of the Frafra potato is mentioned above and there is some evidence that some of the local mucilaginous green leaves are also in decline. The planting of fruit trees, especially citrus, cashew and guava is now becoming widespread. Seedlings are available from a wide variety of sources, especially NGOs and church organisations. There has been a development of commercial nurseries and some farmers are simply buying seedlings on the open market.

Trees in farms and trees in the bush

Farmers in all areas of Ghana leave economic trees in their farms. Such trees are usually referred to as 'subspontaneous' or 'protected'. The most important of these trees are shown in Table 4 (below).

Table 4. Economic trees left on farms

Locust = dawadawa	*Parkia biglobosa*	I
Shea	*Vitellaria paradoxa*	I
Kapok	*Ceiba pentandra*	I
Baobab	*Adansonia digitata*	I
Whitethorn	*Faidherbia albida*	I
Tamarind	*Tamarindus indica*	I
Black plum	*Vitex doniana*	I
Monkey guava	*Diospyros mespiliformis*	I
Mango	*Mangifera indica*	E
Teak	*Tectona grandis*	E
Neem	*Azadirachta indica*	E

I = indigenous E=exotic
Other species recorded were *Lannea microcarpa, Terminalia reticulata, Pseudocedrela kotschyi* and *Mitragyna inermis.*

The usual convention is that the owner of the land has rights over the produce of these trees unless he has otherwise ceded this right. Norton (1987) notes that in a few areas, major trees, such as dawadawa, belong not to the farmer but to the chief who has the right to harvest them and give a portion to the farmer.

Leaving trees in farms has advantages and disadvantages. Farms with trees in the field are unsuitable for tractor cultivation. Although oxen can be guided around a limited number of trees, animal traction becomes problematic is there are too many and the likelihood of residual stumps to break the share. The mango takes up considerable subsoil water and farmers have observed that water-tables fall when there are too many in the farm. Where land is short, the poor crop yields of plants shaded by the tree are perceived to be a disadvantage. On the other hand, trees provide shade, fruit, prevent erosion and return fertility to the soil.

In the low-density areas around Tamale, the trees left in the farm are visibly more numerous and also farmers cite a great many more species. In the high-density region around Bawku often only three species are retained and the remainder grubbed out. This makes income from tree products vulnerable to market fluctuations and threatens trees whose

products are falling in value. The consequence of this loss of diversity is the open landscape. Farmers in UER were much more likely to ask for subsidised tractors than those further south, a pattern contrary to other parts of Africa.

Farm inputs

The use of farm inputs has been strongly driven by the passing enthusiasms of agricultural development projects. Manure was traditionally used, especially in the UER, to increase the fertility of the fields and is still collected and redistributed throughout much of the region. The first inorganic fertilisers were introduced into the region by the colonial government in the 1950s and gradually became a substitute for maintaining soil fertility by traditional means. Through much of the post-Independence era, fertiliser was heavily subsidised. However, the subsidies were progressively eliminated after 1983, with the consequence that they became too expensive for many farmers. Farmers who work with the cotton companies still receive fertiliser at below market prices. Use of pesticides is much less common and is often confined again to chemical used on cotton or for cowpeas. Herbicides are hardly known and indeed often not readily available. Table 5 shows the percentages of farmers using different input types.

Table 5. Percentage of farmers using different inputs

n=529								
Yes/No	**Fertiliser**	**%**	**Manure**	**%**	**Pesticides**	**%**	**Herbicides**	**%**
No	153	28.9	114	21.6	330	62.4	505	95.5
Yes	376	71.1	415	78.4	199	37.6	24	4.5

Interviewees regularly emphasised that increasing prices in the last few years had both decreased the numbers of farmers using inputs and the quantities used.

Developers at work

If any group of people qualify for the title 'the people without history' it may well be developers. By and large development projects are conceived in an absence of information about previous initiatives.

Whatever lessons such initiatives brought home to their designers and the funding agencies were not passed on either to government or to other

bodies. In part, this reflects the extreme fragmentation of the development process, at least in this region. A multiplicity of agencies are inevitably more concerned about their own survival in a competitive market than whether they are duplicating the work of other agencies or repeating strategies that have failed elsewhere.

Northern Ghana has been the site of a series of major initiatives by international agencies, starting with a FAO study in 1977, reprised by FAO/IFAD in 1989. Part of the IFAD project continues as the 'Smallholder Rehabilitation' Project, principally in the area of livestock improvement. In the early 1980s a 'Northern Region Integrated Project' (NORRIP) was conceived to take an integrated approach to planning and agricultural development (anon. 1983). Although the NORRIP village outside Tamale is still functioning, the decline in operational funding has meant that virtually no work is in progress.

The World Bank initiated a National Livestock Services Project (NLSP) in 1993 to improve veterinary care, to finance the construction of communal water holes and introduce the use of improved pastures. During the same period a Forestry Resource Management Project (FRMP) was undertaken, principally in the South. A second phase, the Forestry and Wildlife Resource Management Project (FWRMP) is intended to address savannah forestry issues more directly.

If gaily-painted signboards are held to constitute development, then Northern Ghana has no further need of it. The road to every village is festooned with the signs of NGOs and UN agencies announcing the various development assistance initiatives taking place in the village. There seems to be virtually no control on what NGOs can operate in this region and none on the scope and nature of their projects. If their achievements in the field of sustainable development is sometimes opaque, there is no doubt about their importance in generating secondary employment. NGOs have been reviewed in Alebikiya (1993) and Amanor *et al.* (1993) although for obvious reasons these accounts are fairly anodyne.

NGOs represented include the large well-funded international organisations such as OXFAM and Save the Children, as well a host of smaller operations. Church-based NGOs are important and all the major denominations have some type of operation. ADRA, the Adventist Development and Relief Association, is one the largest players, both in Northern Ghana and in adjacent Burkina Faso. In UER, Actionaid has a major operation in Bawku with subsidiary stations elsewhere in the region.

There has been no overall evaluation of the impact of NGOs on the regional economy and in particular food security. However, in general food security has not increased since food aid is now distributed every year almost independently of climatic variation. During the survey, farmers

were asked about potential improvements to agriculture and a significant minority responded by suggesting increased food aid. This points to a disturbing aid-dependency mentality which is especially widespread in UER.

It is usual to learn that solutions to community problems are worked out with the participation of stakeholders in PRA-type exercises. Through a process of question and answer, it is relatively easy for NGOs to prompt farmers into identifying problems for which the solutions are available because they have 'worked elsewhere'. Throughout much of the northeast of Ghana there is a very high density of NGOs pressing farmers to conform to their agendas. Farmers have become very astute at learning and replaying conventional NGO wisdom during the course of surveys. Farmers can reasonably expect that if they give the correct answers then perhaps the road will improve, a well will be dug or improved goats be handed out. This is troubling for researchers with no very fixed agenda, as the answers that surface in interviews are sometimes in startling contradiction to observed behaviour. The gap between what farmers say they will do and what they actually yawns ever wider.

Continuing food deficits suggest rather more radical thinking is required. As the situation deteriorates, the response is for yet more agencies to open up shop in the North. Although there is a substantial literature on the region and its problems, it is virtually impossible to gain access to it in the North itself.[6] Even if it were more available, it is unclear that reading it would do more than confirm the agencies opinion that these problems are the same as they were half a century ago.

While the pattern of labour migration remains constant, the problem of food deficits remains insoluble. No amount of technical expertise, no amount of highly subsidised inputs, no amount of working with the community to generate solutions will have any permanent impact because the most significant element of the community who must provide labour to execute these activities are away permanently or sporadically. The drip-feed of cash and food they send to their home areas has the effect of providing a disincentive to long-term investment in land management. The chronic nature of this process is illustrated by the succession of claims that each year is 'worse' than the previous year and that ever more food aid is required to make up the nutritional shortfall. Without a major re-appraisal of how the development process fits in both with household structures and the overall imperatives of the Ghanaian economy, which will require

6. An exception that should be noted is the TRAX documentation centre in Bolgatanga.

Government and NGOs to work together in a so far unprecedented manner, there is no possibility of sustainable development.

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3
Livestock in Northern Ghana in Relation to Environmental Conservation and Economic Development

Stephen Hall

Introduction

Northern Ghana is an area where clear presentation is needed of the policy options available relating to crop, livestock and forestry development, environmental protection, international relations and social equity. Under increasing population pressure the area is being called upon to produce more, not only for local subsistence but also to feed the cities of the south. Under the pressures of urgent short-term requirements, traditional practices may be modified and long-term damage may be inflicted on the environment. There is an international dimension as pastoralists of the countries to the north may be tempted across the border to graze their flocks and herds.

The national and international commitment to the development of livestock in northern Ghana is shown by the inclusion of the National Livestock Services Project, with an anticipated project cost of $29 million (World Bank 1992; Kodyow 1995), in Ghana's Medium Term Agricultural Development Program. With funding from the World Bank and other sources, steps have been taken since 1992 in Ghana 'to rationalise, improve and privatise services for supporting the private sector in the production and marketing of livestock'. It is important to predict whether in general the development and intensification of livestock husbandry in Ghana is likely to have adverse environmental impacts especially in degraded and over-populated areas such as the Upper East Region.

For the impact of developments in livestock systems upon woodland to be assessed, data are needed on these systems. A field study was made in February 1997. The principal aim was to describe the livestock systems of two areas of northern Ghana where the pressures exerted upon the environment by people, their livestock and their farming have differed

greatly for a long time. Today the Upper East Region of Ghana (UER) is noted for its high human population density, which is in sharp contrast to that of Northern Region (NR). In the 1931 census, these areas, separated by the Gambaga escarpment and then known as the districts of West Dagomba and Zuarungu, had human population densities of respectively 38 and 444 persons per km^2 (Anon. 1934). This difference persists; census figures given by Runge-Metzger and Diehl (1993) are respectively 17 and 87 persons per km^2 (reasons for the discrepancies in actual figures are unknown). Annual rainfall is 1000 - 1300 mm, in a single rainy season which starts in April, peaks in August and stops in mid-October. Some data on livestock of the Northern region, from a survey in 1988, are reported by Brinkmann (1991). The consequences of the high population density in the Upper East Region, which is less fertile (Nye 1953, 1954) include environmental degradation, as illustrated by Rose Innes (1977), dependence on food aid and seasonal hunger and malnutrition (Tripp 1978).

The livestock systems of these Regions, which traditionally feature the Ghana Shorthorn breed of cattle, are worthy of study in their own right. In the present work, villages around the towns of Tamale (corresponding to West Dagomba) and Bolgatanga (usually known as Bolga and corresponding to Zuarungu) were visited and questionnaire surveys made of farming systems and livestock husbandry. Productivities were deduced from female case histories and body measurements were made.

The cattle of the area are known to be of three types; (a) Ghana Shorthorn. These humpless, locally adapted, small-bodied and short-horned animals are relicts of a type, the Savanna variety of the West African Shorthorn, which formerly had a wider and presumably continuous distribution across the savanna zones of west Africa; (b) Zebu. This term encompasses all the humped, large-bodied cattle which are today the ascendant type in the savanna and which have been strongly associated with the Fulani (Fulɜe) people; (c) Sanga. This term is applied generally to crosses between the Ghana Shorthorn and the zebu. Such animals possess a small hump on the neck and the conformation of the head, ears and horns may also be diagnostic in the field. Most studies on cattle in the savanna zone have been of zebu types; there is a 'dire need' (Rege, Aboagye and Tawah 1994) for further data on the West African Shorthorn generally.

In rural Ghana most sheep and goats are of the West African Dwarf (Djallonké) breeds. Data are lacking on whether Sahelian sheep and goats have had any influence. The latter breeds are much taller and have long ears and tail. They are frequently bought from traders to be kept in a system combining free ranging and stall feeding, within towns.

Study areas

Tamale (200,000 inhabitants; 1°15' W, 9°20' N) is in the guinea savanna zone about 400 km due north of Accra. Bolga (80,000 inhabitants; 1°15' W, 10°50' N) is about 145 km north of Tamale about 20 km south of the border with Burkina Faso and in the sudan savanna zone. In or near each town, regional offices of the Veterinary Services Department and Animal Production Department are active in providing animal health and extension services. Seven days were spent in fieldwork in ten villages around Tamale and five days in three extended villages around Bolga, between 9 and 26 February 1997.

Methods

Questionnaire surveys of livestock systems

Owners of animals were interviewed and case histories were collected for breeding females. This produced a set of female case histories from which productivities can be deduced (Sandford 1982; Hall, Gnaho and Meghen 1995). Linear body measurements were taken as inferences can be drawn from such data about breed affinities and body weights. Numbers of breeding cows, of oxen and of total herd size were recorded for each herd of cattle.

In each study area, villages were chosen by reference to a map and each was visited during an afternoon. The village chief was interviewed and requested to ensure that animals were not released from their owners' houses or compounds the next morning. Owners of animals nominated by the chief, were interviewed (n=21 Tamale, n=21 Bolga) either during the afternoon or the next morning.

Two questionnaires were compiled, one for village chiefs and the other for owners of livestock. Respectively, these took about 15 minutes and 60 minutes to administer. Village chiefs were asked what species were kept in the village, what were the problems of keeping each species and what could be done to help with animal husbandry, health and marketing. They were asked whether there were any local restrictions on grazing and what were local attitudes to the use of tree products. Livestock owners were asked which species they kept, whether and how they used animal traction, how they kept and fed their livestock, why they kept each species, what were the problems associated with each species, when and to whom they had last sold animals, when they used veterinary services and when

they had last purchased drugs. Questions were also asked about crop cultivation. Discursive answers were encouraged and further information was sought opportunistically from other local people. Herd owners were asked how much one would expect to pay for different types of livestock.

Near Tamale, ten men were interviewed in their capacity as village chiefs. A total of 21 men were interviewed as owners of livestock. Near Bolga, three chiefs and a total of 31 livestock owners were interviewed.

Results

Livestock systems

Around Bolga cattle are kept in small herds (often no more than 5 or 6), in the dry season roaming the fields in search of food during the day and being confined within the compound at night, where they are also confined during the wet season. These cattle are almost exclusively Ghana Shorthorn while around Tamale the rather larger Sanga (the crossbred of, usually, Ghana Shorthorn cows and zebu bulls) is generally seen.

Around Tamale mixed herds of Sanga, Ghana Shorthorn and zebu cattle roam the bush usually under the guardianship of Fulani herders – these cattle may be owned by town dwellers. In this area cattle are kept in relatively large herds (maybe up to 200 animals) outside the village, spending the night in a kraal and the day in both wet and dry seasons being herded around the bush in search of food. This herding may be by a hired Fulani or by the village children who are too small to work in the fields. In both areas, schools are found in most villages, and they normally operate a shift system, being used by two sets of teachers and children each for half the day, so children who herd cattle are not automatically excluded from school.

It became clear in the study that the Ghana Shorthorn cattle of Bolga are much more likely to be free of introgression of zebu genes than are the Ghana Shorthorn of Tamale; only one individual in the Bolga sample could have been classified as Sanga.

Chickens and guineafowl are ubiquitous; donkeys are increasing in importance around Bolga while they are much less frequently seen near Tamale. Donkey carts made of sheet steel and tubular steel are manufactured at Tamale and are widely used around Bolga. There do not appear to be many specialist breeders of donkeys in Ghana yet, most animals being imported from Burkina Faso. Pigs are increasing in

importance, being mainly of Large White type in the areas studied. They were kept in confinement all year in the Tamale area but around Bolga where Islam is less strong they were allowed to roam the fields during the dry season.

Use of tree products is much more prominent around Bolga where all respondents feed the pods of the thorn tree (*zawama*) and acacia browse to livestock during the dry season. Nowhere were there any restrictions on the movement of livestock, provided they were kept out of the crops. Around Bolga, local custom permits the cutting of browse provided the tree is not destroyed thereby.

Herd and flock structure

Of the 21 respondents at Tamale, 14 owned cows. The numbers of cows in all these herds was known and for 10 herds, the other animals were roughly counted as well. Total number of all cattle in the herd ranged from 20 to 300, median 60. Herds at Bolga were much smaller; 21 out of 31 respondents owned cows and 6 herds were enumerated (total cattle 4 – 16, median 8.5). Breeding females formed only a small proportion of each herd. Mean numbers of cows were, at Tamale, 8.4 and at Bolga, 2.8; of sheep, at Tamale, 2.9 and at Bolga, 4.7; of goats, at Tamale, 3.6 and at Bolga, 2.8. All these means differ significantly (S.J.G. Hall, in preparation).

The complete structures of 6 herds at Bolga were recorded. These comprised a total of 56 animals and the average composition was 3.3 cows, 1.8 bulls, 1 heifer, 0.8 young bulls, 2 calves and 0.8 oxen.

Investigation of productivity by female case histories

A total of 194 cow case histories were obtained and are discussed in detail elsewhere (Hall in preparation). The fate was ascertained of each calf born. Some were, usually when several years old, subsequently sold, given away or slaughtered at home and these animals were termed 'marketed'. In most respects (juvenile mortality, proportion marketed), Ghana Shorthorn and Sanga cows performed similarly at Tamale, while the former performed similarly to Ghana Shorthorns at Bolga. Overall, performance was similar to that of similar cattle elsewhere in west Africa. However, Ghana Shorthorns at Bolga showed a higher incidence of pregnancy (57% of the 42 cows were currently pregnant, while of their 73 counterparts at Tamale, 29% were pregnant) and had produced fewer calves (mean number of calves per Ghana Shorthorn cow, at Tamale 3.06, at Bolga, 2.19). This implies cows were younger at Bolga, and the apparent underrepresentation

of old cows therefore raises the possibility that cows are sold while they are still capable of breeding. About 16% of calves were subsequently marketed.

With sheep and goats (96 and 72 case histories respectively) performance was, likewise, similar to that observed elsewhere in west Africa (S.J.G. Hall in preparation). For both, number of litters per female was larger at Tamale (sheep: respectively 2.7 vs. 2.1; goats: 2.4 vs. 1.8). As for cows, this implies breeding females are younger at Bolga. About 20% of lambs and 23% of kids were marketed.

Characterisation of breeds

Cattle

Comparing the 23 Ghana Shorthorn and 8 Sanga cows measured at Tamale, the former were shorter at the withers (mean 116.1 vs. 111.1 cm). Full details are given by S.J.G. Hall (in preparation). The 43 Ghana Shorthorn cows at Bolga were smaller in all measurements (heart girth, withers height, body length, pelvic length and pelvic breadth) than their 23 counterparts at Tamale. For the present discussion the most important differences are those in heart girth: mean 139.3 at Tamale vs. 131.1 at Bolga, and withers height: mean 111.1 at Tamale vs. 101.1 cm at Bolga.

Sheep and goats

Sheep and goats from Tamale (48 and 38 respectively) were larger in body length, withers height and heart girth than those from Bolga (46 and 27 respectively). Sheep at Bolga were longer-eared (median ratio of ear length to withers height 0.19; Tamale, 0.18) and longer-tailed (median ratio of tail length to withers height 0.48; Tamale, 0.44).

Prices

Prices for most classes of livestock were higher at Tamale than at Bolga but herd owners at Bolga were noticeably reluctant to express opinions on this subject.. The current exchange rate was 1760 cedi = $1; 2930 cedi = £1. Predicted prices in cedi for a working ox were 413,000 at Tamale, 317,000 at Bolga; for a young heifer or bull 181,000 at Tamale, 153,000 at Bolga; for

a young sheep 26,000 at Tamale, 23,000 at Bolga. Other classes of livestock showed the same pattern, of higher prices at Tamale.

Discussion

Herds of cattle were much larger around Tamale; some were entrusted to professional herders and were kept not only to provide traction animals, but also for investment and commercial purposes (S.J.G. Hall, in preparation). Breeding bulls in such herds were often of humped (zebu) type.

Around Bolga, herds were kept almost entirely to provide traction; some cattle owners had too few animals for their needs and would borrow or hire oxen or tractors. There is clearly insufficient grazing land for extensive grazing and a lack of entrusted herds, and the Ghana Shorthorn appears to remain in a relatively pristine state without visible influence from humped cattle. The body dimensions are informative in this respect. While the significant differences in heart girth and body length could indicate that, nutritionally, Bolga is a harsher environment than Tamale, the difference in withers height implies a genetic difference (withers height is thought to be relatively insensitive to environmental conditions in cattle: references in Hall 1991).

The rather shorter calving histories, higher pregnancy rates and higher incidence of primiparity of the Bolga cows suggest they are younger than those of Tamale. If older cows are underrepresented at Bolga this may be because they are being sold. It is not known whether Bolga is a source of cows which are used for breeding elsewhere, or whether cows are sold for slaughter while still capable of breeding.

Sheep flocks around Bolga were significantly larger than those around Tamale; the converse was true for goat herds. As sheep are less active and more easily controlled and kept away from crops during grazing it is possible that they may to some degree have replaced goats around Bolga. Juvenile mortality rates for both species are broadly similar to those found in other studies.

The differences between Bolga and Tamale in body dimensions of sheep and goats could be explained as follows. The generally small size could indicate selection for this attribute in the more rigorous environment of Bolga while the relatively greater length of ears of sheep there may indicate gene flow from the Sahel.

Survival and offtake rates of cattle, sheep and goats in the present study are broadly similar to those reported previously. There have been few

studies on the actual causes of death but it is generally known that lambs and kids born in the wet season are more likely to die.

Characterisation of breeds

In West Africa, the cattle, sheep and goats of the northern and more savanna-like regions tend to be taller at the shoulder and often larger-bodied than those of more southerly areas (Hall 1991). The present study shows an exception to this rule in that the more northerly area, around Bolga, has rather smaller livestock than the southerly area around Tamale.

Two explanations are possible; they may be different breeds, the rather larger dimensions of Tamale cows implying zebu influence, or they may be of the same breed but the larger ones are better fed. For the cattle in the present study both explanations are equally plausible but what is clear is that zebu influenced has bypassed Bolga and has made itself felt around Tamale.

However in the case of the sheep and goats, long ears and tail are associated with Sahelian influence and for the former, the ratios of these measurements to withers height are clearly greater for the Bolga sample. The relatively longer ears and tail of Bolga sheep suggests an influence of Sahelian genes. In this species such an influence would be thought to increase withers height and maybe other body dimensions too, but this has not happened, suggesting that poor conditions of husbandry of sheep and goats around Bolga have overridden such effects. Perhaps this indicates that breeding programmes aimed at the further introduction of Sahelian genes would depend for their success on improvement of husbandry.

Prices

Compared with the price of meat in the retail market, the price paid to the farmer for an animal has usually been very low in Ghana. Osei (1973) found the mark-up from farm gate to market to be about 225% (the corresponding figure in the USA was 113%). The situation has not changed; the figure given by Wenner and Mooney (1995) was 150–300%.

The farmers of Bolga obtain lower prices for their stock and in interviews they often made it clear they were only selling because they had no choice. Indeed, the data on productivity and prices, taken together, imply that many females are sold by Bolga farmers before they become very old and infertile. There could thus be geographical stratification of livestock

breeding, and Bolga might be a source of animals which are used for breeding elsewhere.

The National Livestock Services Project

The project involves (a) institutional and policy reform ($7.01 million, 24%) – aimed primarily at privatising health care, restructuring animal production and health services and monitoring the incentive framework; (b) investment – mainly in animal health services ($9.6 million, 24%), the provision of water for livestock ($4.43 million, 15%), the development of rangelands ($2.1 million, 7%), breed improvement ($4.84 million, 17%) and a pilot dairy scheme ($1.1 million, 4%). As part of the National Livestock Services project, a cadre of private sector Community Livestock Workers, licensed individually by the Veterinary Services Department, is being established who would perform simple prophylactic and remedial treatments in the villages (World Bank 1992).

The Animal Production Department and Veterinary Services Department of the Ministry of Food and Agriculture, which were recently separated as one of the reforms of the National Livestock Services Project, are responsible for promoting livestock health and production.

Environmental conservation is not an explicit concern of the project. A limited environmental impact assessment indicated the most likely negative effects related to the possibility of overgrazing of rangeland and that this could be controlled by a system of opening and closing water sources (World Bank 1992). It was also proposed that livestock owners would be 'organised into associations around water supplies' and that these associations could control burning of the range and assist with introduction of tree legumes, in the form of intensive plots located close to dwellings and kraals for cut and carry utilisation.

Livestock and woodland conservation

The most obvious reason why cattle, sheep and goats merit special attention by those concerned with forestry policy is because these are the species which browse. Under African conditions their productivity is usually low, with herds and flocks including infertile or subfertile individuals and relying upon extensive foraging, with little or no dry season supplementation, and with management usually aimed at increasing herd size rather than maximising offtake. This system is well

adapted to prevalent extensive conditions but under intensified conditions productivity can be greatly increased by the removal of infertile animals, and the improvement of herd fertility and survival by better feed and veterinary care.

Increases in agricultural production can be achieved by increasing the area being farmed (extensifying) or by increasing the yield per unit of production (animal, field, farm worker, unit of capital) per unit of time (intensifying). In ecologically fragile areas where there is a tradition of agriculture and livestock husbandry, intensification of farming is less likely to lead to environmental degradation than is extensification. This is because intensification requires less dependence on common pool resources and thereby the acceptance by individuals of responsibility to ensure continued access to resources. Intensification requires higher inputs and may be unattractive to small scale farmers who normally base their strategies on avoidance of risk rather than maximisation of profit.

The main conclusion is that intensification and livestock-crop integration, which are further advanced around Bolga than around Tamale, have not led to a fall of livestock productivity, although the main activity in the former area is crop production. In Fulani-managed herds of cattle, surplus animals are not marketed but are retained within the herds. This is likely to lead to overstocking and environmental damage. The growth of such herds should not be encouraged.

Dependence on animals (originally cattle but now donkeys also) to provide traction, began in northern Ghana in the 1930s, with official encouragement. This innovation (known as mixed farming) was partly motivated by the opinion that increased crop yields could be obtained if more animals were kept, for production of manure and for cultivation (Benneh 1972). Today a major reason for keeping cattle is the provision of traction, though Langyintuo (1996) also emphasises the social aspects.

It is possible for livestock numbers to increase but without improved integration of livestock and crops. This may happen when herds are entrusted to professional herders (i.e. Fulani). Such herds may belong to urban individuals who may have no other stake in the countryside, or to farmers who prefer to concentrate on crop production and who may derive little or no manure or animal traction from these herds.

Recent history

Forestry is being seen more and more as a package of systems of land use rather than solely as a system of timber production. Policies for forests and woodland must take account of the multiple uses of these areas and must

be integrated with policies for agricultural development and for the conservation of biodiversity. Particularly in ecologically fragile areas, where maintenance and enhancement of tree cover are essential to arrest environmental degradation, development projects which may impinge upon forestry must be examined in the light of their possible effects upon tree cover.

Since the very destructive bush fires of 1982–83 attempts have been made in Ghana to enlist community support for control measures. A series of workshops conducted by the Department of Crop Services, Ministry of Food and Agriculture in 1994 led to the conclusion that bush fires often arose through accident or negligence, or deliberately in the course of hunting, or that farmers might set fire to grasslands early in the dry season in order to obtain a new flush of herbage. Generally, francophone countries such as Burkina Faso and Mali were found to be much more effective at controlling bush fires (Anane *et al.* 1993) though community pressure in Ghana can be effective in enforcing local restrictions on burning (Anon. 1994).

Environmental degradation attributed to livestock

The 1994 workshops did not reach a clear conclusion on the relationship between the grazing of livestock and the incidence of bush fires. Although herders might cause fires, cattle might be expected to reduce the accumulation of dry matter thus reducing the chance of a hot and highly damaging bush fire.

The degree to which the Fulani system of herding is harmful to the savanna environment needs to be understood. In April 1988 the Ghana Government expelled Fulani-owned herds from the Northern Region in what was called 'Operation Cowleg', even though real evidence of environmental degradation induced by bad stockmanship seems to have been lacking. Now, Fulani-owned herds, which would be transhumants from Burkina Faso, are rarely if ever seen in the Northern Region in spite of the considerable pressure on grazing land that exists seasonally in neighbouring countries. The large herds encountered in the field probably mostly belong to urban Ghanaians who favour this kind of investment. Clearly, a social and economic study of this pattern of ownership would be timely. At the biological level, greater understanding of the interactions between such herds and savanna woodland would be of considerable value.

Integration of policies on forestry and agriculture

It may be possible to modify patterns of fallowing, or to apply constraints on cutting trees for firewood or charcoal, and on the burning of grasslands to obtain an extra growth of herbage.

There is a lack of knowledge on the extent to which livestock in northern Ghana damage trees by browsing, and on whether the cutting of browse to feed livestock leads to a long-term diminution of tree cover. The controls exerted by local communities on browsing and cutting have not been examined in detail. Trees also provide the shade which livestock require (Kabuga *et al.* 1992) and can serve as live fencing (Anane *et al.* 1993) but the values placed on these services by communities, in comparison with those placed on other products and services derived from trees, have not been quantified.

The growth of trees is compatible with cultivation of fodder or crops but more knowledge on the extent to which the one may compete with the other would be useful. For example during the six month rainy season in the guinea savanna, 'grasses growing naturally under shea trees' yielded 800 kg/ha dry matter in a grazing trial (Tuah *et al.* 1992); this seems considerably less than the 2000 kg/ha dry matter considered (World Bank 1992; Anon. 1994) to be usual under natural range conditions. It is known that different crops have different responses to shading by shea trees (Anane *et al.* 1993). In contrast, *Faidherbia albida* drops its leaves in the rainy season and therefore does not shade crops; in Mali this species is recommended to be retained at 40 mature trees/ha on farmers' fields. Trees can be propagated by protection of natural regeneration or by planting. The shea tree takes 12–15 years to grow from seedling to fruiting age but regenerated plants bear fruit after only 8 years (Anane *et al.* 1993). Promotion of regeneration is clearly a more rewarding activity than growing from seed and it may prove more in accordance with local customs which often disfavour the planting of native species of tree.

Recommendations

Three sets of implications for the development of policy are evident from this preliminary analysis:

- there should be dialogue between makers of forestry policy and makers of livestock policy. The mutually beneficial coexistence of livestock and woodland is most likely to be promoted by policies which promote the further intensification of livestock husbandry as the alternative, policies

which lead to extensification, will damage woodland and forestry. The Animal Production Department and Veterinary Services Department of the Ministry of Food and Agriculture, which were recently separated as one of the reforms of the National Livestock Services Project, are responsible for promoting livestock health and production. They are committed, through the privatisation initiatives, to intensification. Their activities would seem unlikely to add to the appeal of extensification (one aspect of which is the Fulani system of herding) and therefore appear likely to be of benefit to forestry and to environmental conservation;

- compared with the benefits of simple improvements of husbandry, such as the use of crop residues as fodder and the provision of simple housing and health care, which can easily be put into effect by local people, the value of expensive schemes of genetic improvement of breeds which are sometimes proposed for savanna livestock would seem questionable. In general, livestock projects would benefit from a systems analysis of all the factors involved in the keeping and marketing of animals and their products and services, and efforts should be targeted towards the removal of constraints. This seems preferable to the currently favoured sectoral approach in which support is given to components of the system without clear definition of how these components interact;

- the quality of policy advice will benefit from the application of new methodologies. Northern Ghana could well provide excellent opportunities to develop these. For example, the question of why people keep livestock could be investigated there, in an area where widely different farming systems exist in close proximity.

Preliminary indications from this work are that the following practical initiatives are likely to promote intensification:

- encouraging the husbandry of species which are well adapted to intensive farming, such as pigs;

- reducing juvenile mortality of cattle sheep and goats, principally by improving housing conditions during the wet season, and perhaps by investigating the possibility of rearing systems for twin births which often fail to survive;

- giving farmers more control over when they sell animals; a credit scheme involving advance of small loans on the collateral of the animal itself (with an insurance element) may be workable;

- providing watering points for cattle in such a way as to favour small, village-based herds rather than urban-owned, Fulani-managed herds.

Specific policy recommendations for forestry will emerge when the present study has been merged with other work. Yet, at this stage, some preliminary recommendations can be made. Firstly, it is to be noted that trees can be propagated by protection of natural regeneration or by planting. The shea tree takes 12–15 years to grow from seedling to fruiting age but regenerated plants bear fruit after only 8 years (Anane *et al.* 1993). Promotion of regeneration is clearly a more rewarding activity than growing from seed and it may prove more in accordance with local customs which often disfavour the planting of native species of tree. It would probably be easier to protect damaged trees from grazing and browsing than plots of seedlings or transplants. The possibilities of collaboration between the Forestry Department and the Veterinary Services Department should be investigated in order to harness, or replicate, the Community Livestock Worker scheme for the promotion of forestry, especially regeneration of trees. The attendance at school of children who are or who will be engaged in herding livestock should be studied because this may show whether formal education is likely to be an effective medium for diffusing environmental awareness to those whose activities may be particularly damaging to the environment.

Northern Ghana presents human, social and environmental problems that must be addressed and this must be the priority for research. Nevertheless the quality and diversity of the data available commend the area as a fruitful source of new ideas and concepts in development studies.

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4
Changing Farming Practices in the Forest Guinea Savannah Zone of Ghana

Kofi Marfo
Steve Wiggins

Introduction

Ester Boserup (1965) argued that population growth usually gives rise to intensification of agricultural production in peasant farming. In part this is because high population densities lead to the development of towns which act as a market for farm produce, thus pushing up farm-gate prices for surplus farm produce. If so, might we then get intensification when market access is good and farm-gate prices attractive, irrespective of population density (Pingali, Bigot and Binswanger, 1987; Guyer and Lambin, 1993; Goldman and Smith, 1995)?

This paper looks at part of Ghana's 'transition zone', where forest starts to give way to guinea savannah. The study area, Wenchi District, is lightly populated, but is linked by good tarred roads to Kumasi, so that food produce can usually be sold in local market centres at attractive prices for onward shipment to Kumasi and Accra. Data, both qualitative and quantitative, were gathered during one year's fieldwork carried out in Wenchi District, Brong Ahafo Region beginning February 1995. Four locations were selected purposively to show differences in their access to market, as reflected in distance from market centre, condition of the road and the regular bus and lorry services. Ten households in each village were selected for surveying from a list stratified by the gender of household head.

The study area

Wenchi District has a bimodal pattern of rainfall distribution, with an annual mean of 1300 mm. This makes possible two cropping seasons in a year, a major season from March to August and a minor one from

September to December. The district contains a range of vegetation from woodlands to more open grassland. Wenchi is sparsely populated with a density of 30 persons per km^2 in 1984, compared to the then national average of 52 persons per km^2.

Farming is the main economic activity. In the past, agriculture in Wenchi possessed features of both forest and savannah cropping systems. Over recent decades, the trend has been one of a shift from crops typical of the forest to those of the savannah, in response to the changes in the environment and market demand. Thus the production of cocoa, plantain and cocoyam has virtually disappeared, whilst that of cassava, maize and vegetables (tomato and garden egg) has increased in importance. Farming has generally had relatively few inputs other than human labour and seed: only recently have a few tractors, chemical fertilisers and pesticides come to be used on some farms. Consequently, despite the relative abundance of land, only small farms are tilled. Some farmers keep livestock, but most have nothing other than poultry.

In addition to the long-standing Brong residents of the area, settler farmers and seasonal immigrant labour are important. Most of these farmers and labourers originate from the north-western part of the country (Upper West Region) – seen by Nsiah-Gyabaah (1994) as refugees from a degraded environment.

The general characteristics of the sample villages are summarised in Table 1. The seasonal accessibility of the road and the schedule of regular bus and lorry services set the locations apart in terms of market access. In general, prices were lower at locations with poorer access to market.

Land was abundant. Some remote villages still had land to which indigenous farmers could lay claim so long as it was cropped. Settlers had access through the payment of a token rent which was fixed at the beginning of each season.

Extension support, most of it to maize cultivation, was concentrated in locations with good market access. Only one household in the sample had access to formal credit in the study year. In the past, credit use had been important at Awisa where it was mainly used for the purchase of inputs, particularly fertiliser, for maize production.

Household characteristics and livelihoods

Summary data on the characteristics of households by location type are presented in Table 2. Households were relatively small, little more than nuclear families. They were slightly larger in villages with better market access.

Table 1: General characteristics of sample villages

Location	Population (1984 census)	Density (per km^2)	Major farmer group	Major land tenure	Seasonal immigrant labour important	Distance to major road (km)	Distance to marketing centre (km)	Presence of middle-men	Road accessibility	Vehicular schedule	Market accessibility rating
Awisa	1669	83	Native	Own	Yes	0	8	Yes	All year	Daily	Good
Nchiraa	3865	92	Native	Own	Yes	11	11	Yes	All year	Daily	Good
Botenso	598	50	Settler	Rented	No	20	20	Yes	Seasonal	None	Poor
Hani	1170	33	Native	Own	Yes	15	15	Yes	All year	None	Poor

Notes: The population density figures should be treated with caution because there is no sharp delineation of farm boundaries between villages. The market accessibility rating indicated is what is used to differentiate locations in terms of market access.

Source: Ghana Statistical Service. 1987a, 1987b; Survey data, 1995

Table 2: Summary farm and household statistics, transition study area

	Good market access		Poor market access	
	Mean	Median	Mean	Median
Household characteristics				
Age of head	49	47	50	49
No. of adults	3.8	3.5	3.1	2.0
No of adult equivalents	5.3	5.3	4.8	4.3
Farm size, ha				
Food crop managed	3.5	2.8	3.6	3.1
Old	0.7	0.6	0.9	1.4
Current year, major season	2.0	1.4	1.9	0.4
Current year minor season	0.9	0.8	0.8	0.0
Fallow, right of access	4.3	3.6	7.2	6.0
Land use intensity in space	50	52	36	36
Land use intensity through time	60	52	40	40
Labour use intensity (person-days worked per ha)	127	121	154	161
Total value of crop production, ('00 Cedis)	1901		2005	
Value of 1995 food crop sales as a % of estimated total output	52		20	
Mean household cash income ('00 Cedis)				
Total	1653	974	797	576
Farm	1437	948	589	451
Total crop	1414	948	516	451
Food crop	1314	819	491	375
Tree/cash crop	94	0	25	0
Livestock	23	0	72	0
Farm labour	14	0	3	0
Non-farm work	135	48	186	15
Remittances	68	0	19	0
Household cash expenditure ('00 Cedis)				
Total	1114	876	713	609
Food	397	312	212	160
Other non-farm	411	357	324	311
Farm	327	233	177	75
Of which, Farm labour	196	161	128	74
Adoption of modern practices on at least part of farm, per cent				
Variety	65		5	
Row planting	55		10	
Fertiliser	25		5	
Contact with extension ever, %	55		10	

Notes: A child (i.e. age up to 16) is considered to be 0.5 adult equivalent. Current year sales in actual fact depended on previous years' output. It is assumed in the estimate of sales that 1995 production was not greatly different from that of 1994. The value of major season production used the field data collected, whilst minor season production was estimated by assuming that output would be roughly proportional to field size.

Source: Field survey

Typically, households in both sets of villages tilled around 4 ha of food crops, and had access to another 4 ha of fallow in the villages with good market access and to 6-7 ha in those with poor market access. There were few fields of tree crops found in the four villages. About half the farm was tilled at any one time where there was good market access, but only one third or so in areas with poor market access. The land was worked quite hard, with 120 to 160 days typically worked per ha (the lower figure for areas with good access reflects labour saved by using tractors to prepare the land). In the villages with good market access there was much greater use of some 'modern' practices and much more contact with extension services than in the places with poor access to market.

There was a remarkable similarity in the average value of crop production in the two sets of villages: Cedis 1.9M and Cedis 2.0M (US$1.6k and US$1.7k).[1] However, there was a major difference in the percentage of crop production which was sold: just over half in the places with good market access, one fifth elsewhere. Thus cash incomes from farming were more than twice as high in the former compared to the latter villages. Crop sales dominated cash incomes: for most households receipts from livestock, labouring, off-farm work and remittances were trivial. Correspondingly, cash expenditures differed, with households in the well-connected villages spending significantly more than those in the more isolated settlements, for all the main spending categories. Differences in spending were not as sharp as those in cash incomes, as households in the villages with good market access appeared to be saving cash whilst those in the more remote areas appeared to overspend slightly.

Farming

Cropping systems and patterns

Cropping systems could be classified as yam-based, the most long-standing system, as well as maize-based, grain legume (groundnut and cowpea), and vegetable (garden egg and tomato) production. The proportions of the total area of 1995 major season cropped with the different systems at each location type are shown in Table 3. The yam-based systems were more important in locations with relatively poor access to market, but which also had more abundant land.

Sole cropping of maize and vegetables (tomato and garden egg), the newly-emerging systems as well as being the most commercially-oriented, were more important in locations with good access to market. Here, fields were usually ploughed by tractor. Since this necessitated much labour

1. At the time of the study US$ 1 = Cedis 1200.

Table 3 Characteristics and practices of cropping systems, transition study area

	Yam/cassava	Maize/cassava	Maize	Groundnut	Tomato	Garden egg
Proportion of area cropped sown to different systems in the major season of 1995 %						
Good market access	37	10	38	8	1	4
Poor market access	51	21	16	9	1	0
Crop cycle	1. Yam/Cassava 2. Cassava 3. & ff Fallow or 1. Yam/Cassava 2. Cassava 3. Maize/Cassava 4. Cassava 5. & ff Fallow	1. Maize/Cassava 2. Cassava 3. & ff Fallow Ranges from cropping with fallow (sometimes in rot-ation with maize) to continuous cropping without fallow in cases where cassava is relayed into maize	Continuous maize with one or two crops a year, or else in rotation with tomato		Continuous or else as a minor season crop to follow maize.	
Length of fallow period	5-10 years	0-5 years Approaches the maximum if dominated by cassava	None	0-3 years Cropped on fields with low soil fertility	None	3-5 years
Labour use	Moderate High labour requirement for yam mounds	Low to moderate Depends on type of land clearing and preparation	Low None for land clearing and preparation (fields ploughed by tractor)	Moderate High for land preparation (ridging) and harvesting	High requirement for planting, fertiliser and pesticide application, irrigation, and harvesting	Moderate
Cash use	Low to moderate	Moderate	High	Low	High	Moderate to high
Purchased inputs use	Low to moderate Yam seed	Moderate to high Maize seed and fertiliser for fields dominated by maize	High Seed and fertiliser	Low Occasional seed purchase	High Seed, fertiliser and pesticide	High Seed, pesticide and fertiliser
Adoption of modern techno-logy	–	Improved maize seed	Improved seed, row planting and fertiliser	–	Planting method, fertiliser and pesticide	Pesticide, limited use of fertiliser

Note: Tomato is included because of its importance in the minor season.
Source: Survey data, 1995

to remove tree stumps from the fields to be ploughed, farmers preferred to keep such fields under continuous cultivation. Inorganic fertiliser therefore had to be applied to maintain fertility. This was particularly the case at Awisa, where there had been some formal loans in the past.
Maize was sole cropped continuously or alternated with tomato planted usually on just a small part of the maize field. Inorganic fertiliser was normally applied when maize was cropped continuously, as well as tomato crops. Maize following tomato was thus not directly fertilised, but benefited from the residue of the fertiliser applied to the tomato. Garden egg was normally planted as a first crop after fallow, with or without the use of fertiliser.

In contrast, the major cropping system in the more remote locations was yam-based[2], a practice possible since fields could be left in fallow long enough to restore the fertility essential to sustain yam production as well as to allow the growth of young trees whose branches and trunks would then make useful yam stakes. Groundnut and cowpea were normally planted after the harvesting of the crops in a yam-based system, though they were sometimes the first crops after fallow. Planting crops less demanding of soil fertility, such as maize and cassava mixtures, on fields that had just been cropped with yam extended the cycle of cropping.

Returns to cropping systems

The returns for typical major season systems are presented in Table 4. The highest returns to land and labour apply to the long-standing yam-based systems when worked with relatively high inputs. Indeed, the returns to a well-managed yam plot were impressive, yielding a net benefit of US$ 1,738 per ha and rewarding labour US$ 17.5 per day worked. Only vegetable production approached these returns. In comparison, per hectare returns to maize were one quarter or less of those of the yam system, with net benefits to fertilised maize equivalent to US$ 383 per ha and US$ 5 per

2. The yam cycle illustrates typical relay cropping. Land clearing and preparation could be carried out any time between October and March, depending on the planting date of the yam between December and March. Cassava was planted in the yam field from March to May, but it could be later when it did not compete for the available labour – spreading the planting of the crops maximised the benefit to household labour. The field was weeded twice in the first year and once in the second year. Yams were harvested, usually twice from each plant, from August to November, irrespective of planting time. The earlier the date of planting, the better the yam yields, since it made possible a longer period between the two harvests. Early planting depended on labour available in the household, so that labour constraints during land preparation were costly in reduced yields. The cassava was harvested from 9 to 18 months after planting, depending on the variety and the market price.

day worked in the maize fields. Even so, the returns to labour were quite attractive, confirming images of Wenchi as good farming country.[3]

Table 4: Net returns to land and labour at average

	Returns at average prices in '000 Cedis	
	to Land (one ha)	to Labour (person-day)
Long duration systems (two years cropping or more)		
Yam/cassava/ maize, high input (Botenso)	2085	21
Yam/cassava/maize, low input (Hani)	1025	15
Maize/cassava (Botenso)	312	7
Short duration systems (less than one year) – all Awisa		
Maize without fertiliser	259	5
Maize with fertiliser	460	6
Garden egg, moderate input	1512	15
Garden egg, high input	2048	10

Notes: The returns to the long duration crops are expressed in equivalent annual returns using a discount rate of 10 per cent. The terms *low input* and *high input* for the yam/cassava systems refer to labour and yam seed and are used in a relative sense. Differences in input use on garden egg refer to the different levels of application of inorganic fertiliser and pesticide. Higher pesticide use involved higher frequency of application and, therefore, higher labour use.
Source: Survey data, 1995

Given the large differences in returns to different cropping patterns it may be wondered why the whole area was not covered in yam and garden egg. Yams, however, can only be planted after a fallow of five or more years; whilst the riskiness of vegetable market prices and the high demand for cash to buy inputs limit the area sown to vegetables. Moreover, although maize and cassava may not give such attractive returns, they do have the advantages of being simple to store (cassava unharvested in the ground) and almost always having a ready market.

Conclusions

It therefore seems that access to markets for farm produce can induce intensification independently of population density. Indeed, in this particular case, villages with good market access have seen a boom in their

3. The returns to labour are particularly attractive when compared to the cost of hired labour, which cost from US$ 0.90 per person-day at locations with poor market access to US$1.30 at locations with good market access.

farming over the last decade or so, evident in two dimensions. One is the greater frequency of cropping and indeed continuous cropping on some fields. The other is the introduction of some high value cash crops, garden egg and tomato, produced almost exclusively for the market.

Vegetable production is, however, limited owing to the high inputs of labour and heavy cash spending on fertiliser, seed, and pesticide which are necessary if they are to yield well. It is thus not surprising that most farmers plant only very small areas, fractions of a hectare, to vegetables. Agronomic and physical criteria remain important influences on cropping patterns. For example, continuous cropping of maize fields occurs not for lack of land to allow fallowing, but because these fields have been destumped, a costly investment on a new field.

Nevertheless, these introductions have not replaced the older systems. Above all yam cultivation continues, and gives excellent returns, but can only be practised on land that has been well-rested – land which is at a premium in locations close to the tarred roads.

The case suggests that where there are no serious limitations on cropping from unreliable rainfall or poor soils, and where there is free access to markets, producing and selling food surpluses can produce a measure of prosperity for Ghanaian farmers.

This might be taken to imply that market liberalisation and allowing the markets to 'get the prices right' is pretty much all that is necessary to dynamise West African farming. To a point that seems so, but the inability of farmers in the villages surveyed to plant more than a few hectares of field crops such as maize and cassava, or to sow more than a few cents of a hectare to horticultural crops, points variously to seasonal labour shortages as well as to the limitations imposed by failing capital and insurance markets which make it hard for farmers to mobilise funds to finance expanded production or to accept the risk of harvest failures. Moreover, it seems the introduction of cropping cycles with little or no fallowing will sooner or later pose agronomic and environmental questions of soil fertility[4] and the management of pests and diseases. At that moment the availability of research results may be critical to sustaining the area's farming.

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5
The Cotton Sector in Northern Ghana: Liberalisation, Seasonal Input Use and the Impact of Structural Adjustment

Colin Poulton

This paper[1] briefly summarises the performance of the cotton sector of northern Ghana since liberalisation of the sector took place in 1985. It then focuses on one particular aspect of the post-liberalisation story which is of immediate concern to the cotton companies now operating in Ghana: the difficulties in providing seasonal inputs to smallholder farmers on a credit basis in a competitive output marketing environment. The companies have tried to minimise the problem of 'strategic default' by farmers on pre-harvest loans by setting a common price for seed cotton. However, the resulting prices have only served to reduce the general level of farmer commitment to cotton production. In fact, more farmers have registered to farm cotton in recent years for the benefits that this brings to their food production activities, than for the benefit that cotton production *per se* brings. The experience of the cotton sector thus provides interesting insights into more general developments in the agricultural sector of northern Ghana under structural adjustment, as well as providing lessons for the widely encountered problem of seasonal credit provision to smallholders under conditions of market liberalisation.

Cotton production was promoted in post-Independence Ghana as an import substitution measure to supply the newly-established textiles mills in the south of the country with raw materials. From 1968 onwards, smallholder cotton production was encouraged by the Ghana Cotton Development Board (GCDB), which aimed to spread the benefits from

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production of the crop as widely as possible. As production was concentrated in the north of the country, this had added political benefits. Production grew rapidly until 1976, when just over 10,000 tonnes of seed cotton were produced on 24,700 hectares, with most farmers growing a single half-hectare 'unit' of the crop. From this peak, however, production declined steadily, as a result of a vicious circle of low producer prices (Wayo Seini, 1984; 1985), unreliable services and late payment, and the poor financial state of GCDB. By the early 1980s Ghanaian cotton production had almost collapsed.

In 1985 GCDB was privatised. The new Ghana Cotton Company Ltd (GCC) was owned by its major commercial stakeholders, (fertiliser and chemical supply companies, textile companies and a bank), with the Government of Ghana retaining a 30% share until 1995. In the same year that GCC began operation, a competitor, Plantations Development Limited (PDL), entered the sector, albeit only operating in one of the four regions that GCC operated in (Upper West). By the 1996–7 season, a total of twelve cotton companies were operating around the four regions, with others having entered and exited in the meantime. Equally significantly, PDL and one other company, Nulux Plantations Ltd, had constructed ginneries and PDL was about to begin operating a seed delinting plant with sufficient capacity to supply most of the sector.

The introduction of competition had a significant impact on the timeliness and quality of services provided to farmers. In 1990–1 this resulted in the production of seed cotton surpassing the previous 1976 peak and rising to 27,238 tonnes in 1992–3.[2] Higher production levels were attributable partly to the higher number of units cultivated, but also to higher yields. From the outset in 1985, yields under privatised 'management' of the cotton sector have been significantly higher than those achieved during the days of GCDB.

Some important technical issues do remain to be tackled. For example:

- The quality of seed supplied to farmers in recent years has been extremely variable. Whilst PDL are leading the way in ensuring better quality seed, they are still dependent on varieties imported from neighbouring countries, which may not reflect the most up-to-date technology available in these countries. However, it seems unlikely that the Ghanaian companies themselves will be able to fund a national seed

2. This figure remains tiny when compared to better established cotton sectors in neighbouring Francophone countries. Partly for this reason, analysts of the sector reckon that production potential is even greater than that achieved in 1992–3.

breeding programme to develop competing varieties specifically adapted to Ghanaian conditions and circumstances.

- The quality of cotton lint produced in Ghana has been acceptable to domestic processors, who pay an import parity price for it. However, once production of lint exceeds domestic demand, the companies will rely increasingly on export markets, which demand stricter quality standards at both production and ginning stages for the premium prices (Cargill Technical Services, 1996).

Liberalisation of the cotton sector has thus encouraged new investment and led to improved production efficiency.[3] So far, relatively little attention has been paid to technological development issues, this is partly because of the time that has been devoted to solving the problems that form the focus of the remainder of this paper.

The Ghana cotton sector and problems of input supply

Increased use of purchased seasonal inputs, such as improved seed varieties, inorganic fertiliser and crop protection chemicals, by smallholder farmers is critical if the countries of Sub-Saharan Africa are to meet long-term poverty reduction and food security goals (World Bank, 1997: 45,114). It is also vital to the maintenance of soil fertility in areas where increasing populations make reliance on organic manure and fallow periods alone impractical. However, the impact of economic reform programmes on the use of purchased inputs has, at best, been mixed.[4] A major constraint on input use has been declining profitability, as removal of subsidies and devaluation of exchange rates have raised the price of purchased inputs in relation to the price of the resulting commodities produced. The devaluation effect has been more pronounced for staple food crops, many of which are at best only partially internationally tradeable, than for export(able) cash crops, the domestic price of which has risen in line with devaluation.[5] However, even where the use of purchased inputs remains

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3. Liberalisation here should be taken in conjunction with the broader pro-investment reforms carried out by the Government of Ghana. In particular, investor confidence has been raised by the fact that the government has made minimal effort to intervene in the sector since 'handing it over' to private sector operators.

4. Defenders of reform programmes, for example World Bank (1994), argue that incomplete reform, rather than reform *per se*, has been the major cause of disappointing trends in input use.

5. International markets are thin or non-existent for many African staple food crops, whilst high transport costs and low value-bulk ratios insulate prices, in all but the most

profitable, changes that have taken place in agricultural marketing systems may have undermined smallholders' ability to finance it.

The 'financing constraint' view starts from the observation that, in many areas, at the start of the farming season only a minority of smallholder farmers have the cash necessary to purchase inputs.[6] The majority of farmers who could make profitable use of purchased inputs can only do so if they have access to some form of credit. In general, reform of formal sector financial organisations has made it less, rather than more, likely that smallholders with no ready collateral will obtain credit from these sources. Meanwhile, the liberalisation of agricultural output marketing has undermined the provision of seasonal credit by parastatal organisations that could use their control of (single-channel) output marketing to recover loans from smallholders at harvest.[7] In liberalised, multi-buyer markets, a trader who has supplied seasonal inputs to a farmer on credit may well find that that the farmer has sold his crop to another trader, quickly disposed of much of the money and is defaulting on the input loan. Such 'strategic default' is well-established practice in many areas and one which governments pushing through economic reform programmes and subject to democratic pressures may be reluctant to crack down on (Copestake, 1997), if indeed they know how to.

In relatively concentrated marketing systems, for example many high value cash crops (Stringfellow *et al.*, 1996), contract farming or outgrower schemes provide seasonal inputs to farmers on credit, ensuring repayment through restrictions on competition in the output market.[8] Seasonal credit

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accessible areas, from many of the effects of international price movements.

6. With few attractive savings mechanisms and many competing demands for cash, including school and health care fees introduced as part of adjustment programmes, cash received at the end of one season is rarely retained until the start of the next. In many areas, only the wealthiest smallholders have a diversified income base that allows them to use cash from a non-agricultural activity to finance input purchase.

7. Recognising that single-channel marketing systems could facilitate credit provision and repayment is not to argue that this benefit outweighed the many other efficiency costs of such organisations. Moreover, where political pressures for loan 'forgiveness' were strong, even single-channel marketing systems recorded low levels of credit repayment.

8. Where crops are bulky or have to be processed quickly, a single local processor may have a *de facto* monopoly on output purchase. Where several companies or traders operate in a particular district, they might nevertheless divide the villages in that district between them, so that only one deals with a given village. Where contract farmers' rights to the land that they farm is dependent upon their fulfilment of the contract in question, for example in the case of some resettlement schemes (Porter and Phillips-Howard 1997), monopsony may be legally enforceable.

will not be forthcoming for other crops, however, unless mechanisms can be devised for ensuring loan repayment under competitive output market conditions. The experience of the Ghana cotton sector provides interesting insights into this problem.

GCDB offered farmers a complete package of services, from ploughing, supply of seed and fertiliser, through extension advice, chemical supply and application, to marketing. Farmers made no explicit payment for pre-harvest services, with the exception of ploughing, which was not taken by all. Rather, GCDB adjusted the per kilo price of seed cotton to take account of the cost of services provided, the calculation assuming an average yield of seed cotton.

An interesting feature of the liberalised cotton sector is that, despite the new competitive environment, the companies all adopted the same basic contractual package that GCDB had supplied to farmers. In part this may have been because the new companies relied heavily on the experience of a few senior, ex-GCDB staff to establish themselves in business, whilst GCC continued to play a dominant role in the sector.[9] However, there were other, more substantive reasons as well:

The 'take-it-or-leave-it' package offered to cotton farmers allowed the companies to specify – if not to enforce (see below) – desired input levels for cotton production at a time when smallholders in general were reducing the quantity of purchased inputs that they used.

The system of payment for inputs guaranteed farmers some return for their labour even in bad years. This is a benefit that some of the companies considered important during what they see as a 'development phase' of the cotton sector, when many smallholders are still being introduced to the crop and could be discouraged from growing it by a bad season or two early on.

Subsequently, the method of payment for inputs has evolved, such that farmers now make explicit payment for fertiliser, thereby bearing more of the risk associated with its use. However, pre-harvest services are still provided on a credit basis within a 'take-it-or-leave-it' package.

Since 1985 the seed cotton price – and prices of the majority of other components of the cotton package – has been set collectively by the companies. When there were only a few companies, directors and senior management sat together annually to decide the price that they would pay

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9. GCC still accounted for around 60% of national production in 1995–6 – a very creditable performance for a reformed ex-parastatal organisation. This explanation for the retention of the contractual form inherited from GCDB may be described as 'path dependence' (North 1990).

for seed cotton the following season, given projections for the international lint price. As company numbers increased, this system gave way to price leadership by GCC, with other companies waiting to discover what GCC had decided, then following suit.[10]

Companies defend collective price setting by arguing that it reduces incentives for farmers to divert their seed cotton from the company that provided them with pre-harvest services to a competitor, thus avoiding repayment of the farmer's debt. Diversion is facilitated by the fact that members of one family – and sometimes, secretly, the same farmer – can register with different companies. The companies' argument was partially vindicated during the 1996–7 season when GCC offered a per kilo bonus to farmers selling their seed cotton before Christmas, (an attempt to encourage prompt picking before the Hamattan winds began). Other companies were apparently caught unawares by this and claim that many of their farmers sold seed cotton to GCC to benefit from the extra payment. To prevent the same thing happening again, they pressurised GCC to return to the system of price setting by joint meeting.

Predictably, though, the lack of competition in price setting, whilst contributing to the control of output diversion, has removed any dynamic to higher real prices for farmers. As Table 1 shows, there has, in fact, been a steady decline in the seed cotton price relative to prices of major competing crops in northern Ghana since liberalisation of the cotton sector in 1985.

Langyintuo (1990) showed that seed cotton prices were not high enough to provide smallholders with a competitive return to their labour input, at least around Tamale. A field survey conducted by the author of this article and his Ghanaian research partners during the 1996–7 growing season showed that returns to labour in cotton production in two areas around Tamale were significantly lower than those for maize, which in turn were significantly lower than those for groundnuts.

Table 1 also shows that, during the period 1985–95, fertiliser prices in Ghana rose far faster than the prices of agricultural commodities, including cotton lint.[11] Company pricing of seed cotton during the period since

10. One disadvantage of this system was that farmers did not know the price that they would be paid for their seed cotton at harvest time until well after critical labour decisions relating to planting, weeding etc. had already been made, (if at all). A spin-off benefit of the changes introduced for 1997–8 was that the seed cotton price was announced to farmers before planting began.

11. In the late 1980s fertiliser prices within Ghana rose relative to the cedi-denominated lint price as subsidies on inputs were reduced from 45% to zero. In the early 1990s, when the rapid devaluation of the cedi, *ceteris paribus*, affected both fertiliser and lint prices equally, the international lint price fell.

liberalisation has attempted to pass all of the profit squeeze arising from the steep rise in input prices onto farmers (Table 1). Whilst the share of inputs in the final value of a kilo of lint rose from 14% in 1986–7 to 27% in 1996–7, the share paid to an average farmer for his seed cotton (net of input costs) fell from 32% to 16% over the same period. Importantly, however, lower real seed cotton prices have reduced farmers' incentive to apply themselves to cotton production. Average seed cotton yields have fallen steadily since 1991–2 and this has in turn affected company profitability. This is now prompting companies to reconsider their pricing policy. Real price rises were announced for both 1996–7 and 1997–8.[12]

Table 1: Price Indices for North Region, Ghana, 1985–95

	1985	1988	1991	1995
Seed Cotton	100	152	279	639
Groundnuts	100	188	324	949
Maize	100	332	489	1166
NPK fertiliser	100	523	1114	5227
Cotton Lint	100	345	664	2845
Rural CPI	100	216	422	1129

Sources: Seed cotton and cotton lint - GCC; National Cotton Development Project; Groundnuts, maize, NPK (all figures for North Region) - PPMED, Tamale; Rural CPI - Statistical Office, Ministry of Finance (national figures, not just North Region).

Declining farmer commitment to cotton production has been recognised as a problem by the companies for the last few years. It is seen most clearly in the problem of 'input diversion' (discussed below), but is also reflected

12. An interesting aspect of this process has been that the main push for higher prices has come from GCC, bolstered by advice from Caisse Française. Some of the newer, small companies have also supported the moves, but the larger competitors to GCC have had to acquiesce rather reluctantly rather than risk what they see as an even more damaging price war, ('the end of the cotton sector in Ghana'). Companies' positions on this issue would appear to correlate directly with their debt positions, with GCC the majority of GCC's assets fully paid for and depreciated, the newer companies having yet to make significant fixed investments, but PDL and Nulux still trying to pay off loans for ginneries and the seed delinting plant.

in late harvesting and untimely application of labour more generally. In 1993, when cash flow problems in the cotton sector (caused by a crisis in the textile sector) led to a fall in farmer registrations for the 1993–4 production season, several cotton companies took the opportunity to revise their policy on the registration of farmers.[13] Rather than 'campaigning' for farmers and seeking to maximise registrations, as they had done previously, they looked instead to screen farmers and only work with those showing an acceptable commitment to the crop.[14] The number of farmers producing cotton and the total production of seed cotton has thus recovered only slowly from the 1993–4 setback.

Whilst the explanation for declining farmer commitment to cotton appears relatively straightforward, the farmer response – continuing to register for cotton, but giving the crop less priority and often diverting the inputs provided to other uses – requires further explanation. Four factors together explain this:

(i) Fertiliser prices

Table 1 gave an indication of how fertiliser (specifically NPK) prices rose in relation to crop prices over the period 1985–95. This was a national phenomenon, but arguably North Region was worst affected by it. In the 1970s North Region had developed into Ghana's major food surplus region through subsidised fertiliser and ploughing services. In addition to the changes in fertiliser prices, the region was badly affected by increases in transportation costs (for bringing fertiliser to the region from ports in the south and sending crop surpluses to the major markets of the south). Warner (1996) documents various coping strategies adopted by farmers in the region, in response to the decreasing availability of fertiliser. However, these could not fully compensate for lack of fertiliser, particularly around

13. As with GCDB, the private cotton companies rely heavily on the domestic textile firms for the market for their lint. The textile firms have, however, suffered severe competition from imported products following the reduction of tariffs as part of structural adjustment (Jackson 1996). The 1992–3 crisis in the sector led ultimately to payments to cotton farmers being delayed by several months, with the result that farmer registration for the 1993–4 cotton production season had to take place before some of the farmers had been paid for the previous season.

14. New entrants to the sector – there were four in 1995–6, for example – still 'campaign' to attract farmers to work with them. As is mentioned later, this often includes offering to plough a maize plot on credit as an inducement for farmers to grow cotton with them. The GCDB ethos of trying to spread the benefits of cotton production as widely as possible still pervades much of GCC, too, so many senior staff (as well as field staff) still think in terms of campaigning. The new attitude is, therefore, most clearly seen amongst the better established competitors to GCC, such as PDL and Nulux.

Tamale where high population densities are putting severe pressure on soil fertility. Cotton companies, therefore, found themselves promoting a fertiliser-intensive crop at a time when farmers accustomed to using fertiliser particularly on their maize were unable to get hold of supplies at what they considered affordable prices.[15]

(ii) Viability of crops

From the figures in Table 1, *ceteris paribus*, one would expect farmers both to shift out of cotton and into the major competing crops (maize and groundnuts), and to shift out of a fertiliser-intensive crops such as maize and into nitrogen-fixing crops such as groundnuts. Within many North Region farming systems, however, there is only imperfect substitutability between maize and other crops. This is not just because maize is the major staple food of many parts of the region, as well as being an important source of cash income. It is also because there are 'institutional' arrangements that ensure its production. The organisation of agricultural production within the compound can be seen as a response to the problem of embedded labour risk.[16] To ensure that all members of the compound have enough basic foodstuff to eat throughout the year, whatever their individual circumstances during the agricultural season, the compound head has the responsibility for producing enough staple food for all members. To enable him to accomplish this, he is allowed to call on the labour of all other members of the compound as it is required for the so-called compound plot. In many parts of North Region, it is customary for compound heads to provide maize for the other compound members in fulfilment of his role as head. Thus, whilst the decreased availability of fertiliser might reduce the marketed surpluses that can be achieved, adverse movements in the price of fertiliser will not, at least in the short-medium term, alter the basic decision of compound heads to grow maize. Indeed, there may have been an increase in the cultivated area in response to falling yields per hectare.

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15. Fertiliser use fell throughout the country as a result of the price changes. In 1991–4 it is estimated that the cotton sector – although relatively small – accounted for over 30% of all fertiliser imported into Ghana.

16. Embedded labour risk describes the uncertainty facing a household over its own labour availability through the agricultural season. (For a review of issues of embedded risk in rainfed tropical agriculture, see Dorward and Parton, forthcoming). In North Region, Ghana, particular causes of this uncertainty are the impact of guinea worm, which prevents victims from carrying out agricultural activity for months at a time, and malaria.

(iii) Cotton vs maize production

Although cotton production *per se* was becoming less attractive in the years after liberalisation, being a cotton farmer did offer certain advantages in terms of maize production. First, for much of the period cotton companies offered to plough one half-hectare 'unit' of land for food production on credit for each unit of cotton that a farmer cultivated. Second, where maize was planted after cotton in a rotation, it benefited from the residual fertility in the soil from the application of fertiliser to the cotton crop. Cotton cultivation has also been an effective way of killing striga infestation (a particular problem for maize in parts of North Region) in a given plot. Third, many farmers chose to 'divert' some (or all) of the fertiliser supplied for cotton production onto their maize plots. This final practice, whilst strongly disapproved of by the companies, was not effectively discouraged by the terms of the contract offered to farmers. Under the contractual form inherited from GCDB, as a farmer did not make an explicit payment for fertiliser or chemicals, he incurred no debt if he produced a seed cotton yield that did not cover the cost of the inputs supplied.[17]

(iv) Inefficient incentive structure

In trying to enforce their contracts with farmers, cotton companies are in an extremely weak position. It would be impractical to resort to collateral to guarantee the supply of inputs and services for cotton production on credit and, whilst company field staff undertake some monitoring of farmers' cotton production and marketing activities, they cannot observe every farmer's every move.[18] Under these circumstances, the main

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17. Under this contractual form, cotton was also a perfect crop for farmers unsure of their own labour input during the forthcoming season. A stylized explanation of how farmers respond to embedded labour risk is that they select priority and non-priority crops. If the labour at their disposal falls unexpectedly during the season, they concentrate their remaining labour on the priority crops at the expense of the non-priority ones. Cotton requires a consistent stream of labour input throughout the season, making it an obvious choice to be dropped if labour becomes scarce. This would not be a major problem for most farmers in the absence of any penalty for poor yield, particularly as the incentives to grow cotton were heavily loaded towards the beginning of the season anyway. Where labour supply held up throughout the season, the cash income from marketing a high cotton output would be a 'bonus' that could be used to buy a bicycle, roofing sheets or marry (another) wife.

18. Apart from the problem of identifying suitable forms of collateral, a company would be likely to incur the wrath of an entire community if it tried to claim the possessions of members in order to repay a cotton loan. It would then be unable to operate in that village again. This strong village solidarity also casts doubt on the ability of companies to recover debts incurred by poorly performing farmers now that companies have started making an explicit charge for fertiliser.

'punishment' that a company can inflict on poorly performing farmers or those suspected of 'diverting' inputs is to 'blacklist' them, so that they is barred from farming with the company in future.[19] However, several factors have conspired to undermine the effectiveness of such blacklisting. Firstly, primary responsibility for farmer registration at the start of a new season rests with the company front-line staff, assisted in each village by the company's 'chief farmer' there. So far, the incentives provided to these people only to register committed farmers have been weak compared with the personal and social pressure to re-register farmers who have performed poorly in previous years. There are a small number of very common names in North Region and a given farmer may be known by a variety of different names or combination of these names. It is thus difficult for company management to ensure that blacklisted farmers have not been re-registered. Secondly, in the atmosphere of competition between companies since liberalisation, with GCC gradually losing market share to its newer, often foreign-owned and -managed, rivals, there has not developed a sufficient level of trust between companies to permit information sharing between companies on blacklisted farmers. For the reasons given above, such information sharing would only be effective at front-line staff level anyway. However, front-line staff have noticed that their managements do not cooperate very readily and so have not developed relationships with staff of other companies operating in the same villages.[20] A farmer who is

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19. In addition to the application of cotton fertiliser to maize or other crops, the term 'diversion' covers sale of inputs to other farmers within the village or to traders who buy the fertiliser for resale in Techiman and other markets outside the cotton producing regions. Where farmers have been left to apply crop protection chemicals to their cotton crop by themselves, some have similarly diverted chemical supplies to their cowpea crops or sold them to traders for resale outside the region. The black market trade in cotton inputs has become quite big business in North Region, with traders visiting cotton producing villages with trucks at night after inputs have been distributed to farmers and buying them in large quantities – often, apparently, at quite considerable discount.

20. Collective price setting is a form of cooperation. However, it requires minimal trust, as adherence to the agreed price can readily be monitored and a small company that broke ranks on pricing could be penalised by the three large firms by being denied access to ginning facilities. Of the three large firms, the one most likely to raise prices in recent years has been GCC, which in any case has exercised some degree of price leadership. By contrast, information sharing requires that each party believe that the other(s) will make a full and reliable disclosure of information before they will reciprocate. It is almost impossible to confirm whether or not full and reliable information is being disclosed.

blacklisted by one company can thus often get registered by another company, particularly if it is new to the area and looking for farmers (a classic case of adverse selection!). As information on individual farmers is largely personal, rather than documented, screening problems at registration are compounded when an existing company has to send a new member of front-line staff to a village or group of villages, either because of the poor performance of the previous employee or because he has been lured away to work for a new entrant into the sector. At this time, some farmers who have been blacklisted by the company may be able to re-register with that same company without being found out.

Farmers responded to the relative decline in seed cotton prices by continuing to register for cotton production, while exhibiting less and less commitment to the crop, for the following basic reasons: there is strong farmer demand for (affordable) fertiliser (chiefly for maize production); being a cotton farmer provides additional benefits to maize production; and farmers could relatively easily 'divert' inputs or otherwise produce low cotton yields and still continue to be registered for cotton production.

Three additional factors help to explain some of the observed diversity around the basic theme:

(i) As part of the cotton package, the companies bear all the costs of transporting seed cotton from the farmer's village and pay a lump sum for the crop (net of loan repayments) soon after collection. In remoter areas, this service is an important competitive advantage over other crops, for which farmers have to arrange their own transportation to the nearest weekly markets. Under such circumstances, cotton provides farmers with possibly their only opportunity of earning a substantial lump sum payment. Farmer commitment to cotton is observed to be higher in remoter areas than close to urban areas, especially Tamale, where traders visit villages to buy groundnuts from farmers and where farmers can, therefore, also obtain a lump sum from the sale of their crop. In remoter areas, too, it is hypothesised that there are fewer opportunities for black market sales of inputs to traders (though possibly more to other farmers).

(ii) Similarly, in areas where less maize is grown, there may be less diversion of fertiliser to food crops. This would appear to be the case in the eastern parts of North Region, where the main staple is yam rather than maize, and where cotton yields tend to be higher than those observed around Tamale.[21] In the (remote) Chereponi area in the north-east, where

21. Differences in soil fertility may also be a factor, however. Moreover, comparisons between the two parts of the region are hampered by the effects of the inter-tribal conflict in 1994, which severely disrupted cotton production in the eastern part of the

the soils are not particularly suitable for maize, farmers consistently produce high cotton yields (on average, almost twice those recorded around Tamale) with some using the money obtained to buy food. Where rice is grown, however, diversion of cotton inputs is a major problem. Rice production was important in parts of North Region with suitable soils until the end of the 1980s, but has now declined dramatically due to the decreased availability of fertiliser.

(iii) There appear to be significant lags in farmer responses to changes in the price of cotton relative to prices of major competing crops. This is because many cotton farmers have only a limited understanding of the price that they receive for their cotton. Of the sample of 60 farmers contacted by the author and his colleagues, when asked more than one month after planting, only ten knew the (approximate) price per kilo of seed cotton that they would receive at the end of the 1996–7 season. With extremely low levels of literacy, few understand the marketing 'chits' that they receive from the companies, so few even bother to retain them once they have received payment. Thus they are left to compare the lump sum payment received one year (net of deductions for ploughing and incidental advances), with that of previous years. Significant variations in weather patterns and labour availability from one season to the next cause yields to vary, in some cases quite dramatically, so make it extremely difficult to separate out the various influences on the size of payment. It therefore takes several years for farmers to be sure that (real) changes in the size of payment are the result of relative price shifts rather than other factors. This uncertainty over pricing may also have influenced some farmers to continue registering for cotton, even as the price of seed cotton fell relative to that of competing crops. If so, the companies will have to work hard to communicate to farmers that they are now raising the relative price of seed cotton if they are not to suffer a painful profit squeeze whilst they wait for the lagged production response to come through.[22]

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region.

22. The practice begun in 1997 of setting prices before planting and announcing them to farmers so as to influence production decisions is certainly a major step in the right direction.

Conclusion

The Ghana cotton story illustrates some of the problems of supplying credit (in this case in kind) to smallholders in liberalised, multi-buyer markets. To try to restrict diversion of output from one company to another, companies resorted to collective price setting, but, in doing so, removed the dynamic of competition from the price setting process, with resulting negative impacts on production and hence profitability. An informative contrast to this experience is provided by the cotton sector in Sindh Province, Pakistan (Smith and Stockbridge, forthcoming) where provision of credit in kind or cash for inputs is effected despite (price) competition for the purchase of seed cotton. The key to the sustainability of the Sindh system appears to lie with the exchange of information by traders on defaulting farmers. At the time of the study (1996–7) international cotton prices made the crop highly attractive to farmers in Sindh, so they had an incentive to maintain their creditworthiness in order to be able to obtain sufficient quantities of inputs for the next season.[23] Furthermore, the close network of traders operating out of, and around, Sanghar town meant that a farmer who defaulted on his loan repayments for cotton also became ineligible for seasonal loans for other profitable crops (e.g. mangoes and sugar cane). The delicate balance between competition and cooperation struck by the traders in Sanghar required a high level of mutual trust. The fact that most traders in the area came from the same, minority trading community undoubtedly helped here. However, the close geographical proximity of their businesses also meant that they could regularly visit each other and build relationships. Developing a culture of competition with trust is a challenge to those involved in promotion of agricultural marketing enterprise in Sub-Saharan Africa.

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6
A Review of Changes to Farming Systems of Northern Ghana (1957–94)

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Introduction

This chapter highlights certain findings arising from agricultural survey work[1] undertaken in northern Ghana during 1994 and 1995. Many of these findings will also have wider policy relevance for other parts of the Guinea savannah zone of West Africa. The study was conducted in the districts of Gushiegu/Karaga, Savelugu/Nantong, and Salaga[2] in the Northern Region. The Northern Region is the largest of the ten administrative regions in Ghana. Its population density is the lowest in the country (twenty persons per square kilometre compared to a national average of sixty persons). This tends to give the false impression of relative abundance of land. However, the rate of population growth within the Region is among the highest in the country and acute pressure on suitable farm land is being experienced in many localities.

In the description which follows we refer to our detailed agricultural production survey data, to various secondary sources, as well as to unstructured interviews undertaken as part of our exploratory survey. Where appropriate, we make certain qualitative comparisons based on these various sources. We begin by describing land management and crop rotation systems adopted by farmers within the study area. In section 1.2 we describe changes in fallow practices of surveyed farmers. We then move on, in section 1.3, to examine historical changes in farming systems

1. Data presented in this chapter was collected through a formal survey of 140 households randomly sampled from seven settlements within three survey strata.
2. These districts constitute the operational areas of the IFAD/GoG sponsored Smallholder Rehabilitation Development Programme.

in the post-independence period. This description is based on an analysis of our detailed 'plot history' data relating to the years since 1980, and a comparison between our own data and a detailed survey of farming systems in western Dagomba undertaken in 1957 (Akenhead, 1957). Finally, in section 1.4 we attempt to highlight a number of key issues raised in the preceding discussion.

Land management and crop rotation systems

As in other parts of West Africa, the study area is characterised by complex and generally effective systems of land management associated with a high level of awareness by farmers of soil moisture, drainage, crop-specific fertility and other soil characteristics as well as weed and pest control. Much of the rest of this chapter is concerned with assessing how effective these systems have been in responding to increased pressure on suitable farm land (associated with rapidly increasing population).

Mono-cropping, inter-cropping and relay-cropping are all commonly practised by the farmers of our own study area. Looking at surveyed farmers' choice of cropping patterns during 1994 (the most recent year for which we have data) it would appear that just over half of the five hundred and twenty six plots cultivated by these farmers were mono-cropped with maize, sorghum, or some other crop. In this same year, two hundred and fifty five plots (48.5%) were intercropped with at least two crops and sixty five (12.4%) of these with at least three crops. It is noteworthy that maize mono-crops, inter-crops and relay-crops are by far the most common cropping patterns adopted by farmers throughout the whole of our study area. Thus, maize was commonly intercropped with sorghum, millet, groundnut, cassava, yam, pigeon pea and other legumes. Of these, maize-sorghum represents by far the most common intercrop within our study area today.[3] Other common intercrops, which did not involve maize, include sorghum-groundnut, millet-groundnut and yam-millet. In those areas where rice was grown, this crop was often relay-cropped with maize or sometimes yam. By far the most common three crop inter-crop involved

3. It is interesting that, according to a 1957 survey of the area 'Maize and Guinea corn [sorghum] together form the most important cereal admixture, accounting for some 20% of the total acreage cultivated' (Akenhead, 1957). As we shall go on to argue, there appears to have been rather less change in terms of cropping patterns (and adoption of modern varieties) in the post-independence period than is generally claimed by agricultural researchers working in the Northern Region today.

maize, sorghum and pigeon pea. Again, it is notable that all commonly practised three crop inter-crops involved maize, in various combinations with sorghum, groundnut, millet, yam, cowpea and other legumes. Finally, it is common for vegetables and other 'minor' crops to be intercropped with grain and root crops, alike.[4]

These various cropping practices combine to form a particularly complex and well developed rotational system of land management. The first comprehensive written account of the Dagomba system of land management was prepared by Akenhead in the immediate pre-independence period (Akenhead, 1957). According to Akenhead's account, most Dagomba farmers, at that time, planted yams on newly cleared land. In the second year (*'Batandale'*) these yam mounds were broken down and the land formed into ridges and planted with groundnuts. In the third year (*'Kalsogu'*) the land was cleared of weeds and planted with millet without any serious attempt at re-ridging the land.[5] This land was subsequently allowed to return to bush, according to the classic shifting cultivation system. Akenhead also describes the preparation of a *'Worgu'* farm which comprised land, not in the main rotation, which was cleared from the bush and specifically planted with millet, sorghum or bambara nuts. According to Akenhead, the second year *Batandale* was often contiguous with the second year Worgu. Our own survey work confirms that, in spite of increasing population and associated pressure on available farm land, certain important elements of Akenhead's account remain accurate today.[6]

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4. Vegetables are usually grown by women, often as an inter-crop in their husbands' fields. It is likely that (male) compound heads will have underestimated the number of plots on which women will have planted vegetables. In as much, a proportion of those plots defined by the compound head as mono-crops are in fact likely to be inter-crops involving vegetables or 'minor' crops. Similarly, a proportion of plots defined as two crop intercrops are in fact likely to be three crop inter-crops, involving vegetables or minor crops.

5. The majority of surveyed farmers today, continue to prepare farmland using the traditional hoe, in much the same fashion as described by Akenhead. In the absence of affordable herbicide, the vast majority of farmers also weed by hand. Indeed, weed competition represents a serious constraint to agricultural production within the study area.

6. One significant change which has occurred since Akenhead's survey is that yams can no longer be considered to play as central a role within the rotational systems of the Dagomba or other peoples of the Northern Region as they did in the pre-independence period. Instead, certain groups (such as the Konkomba) have tended to focus on growing yams continuously over a number of years on a particular parcel of land. This land is then abandoned when loss of soil fertility becomes a problem. Indeed, it is common for entire Konkomba villages to relocate periodically in search of fresh bush land upon which to farm.

A detailed analysis of this survey data reveals that there is in fact considerable coherence and consistency between surveyed farmers with regard to the types of crops planted during the 1994 cropping season on newly cleared, previously cropped and freshly fallowed land, respectively. Looking first at newly cleared land, it appears that the two main considerations in choosing which crop to plant are the need to take best advantage of relatively nutrient rich soil, and the need to 'break in' previously untilled soil into useful farm land through the planting of 'pioneer crops'. With regard to the latter, sorghum was commonly mentioned by farmers as a pioneer crop suitable for 'breaking in' new farm land. Indeed, our own survey confirms that seventy nine percent of the one hundred and thirty surveyed compounds usually planted sorghum on newly cleared land.[7] The incidence of cultivation of crops other than sorghum on this type of newly cleared land is likely to relate to localised differences in soil characteristics (associated particularly with the size of the clay fraction, drainage conditions and the presence or absence of a laterite crust). Thus, on certain types of land, farmers did not feel that it was necessary to grow land breaking pioneer crops after clearing, since the soil was already deemed to be suitably fragmentable for any crop to be planted, once a minimum of tillage had been carried out. Since newly cleared land will tend to be relatively nutrient rich, it is no surprise that farmers appear also to plant a number of nutrient intensive, high value crops on these newly cleared plots. Thus, according to our survey, compound heads commonly planted yam (39%) and maize (36%) on newly cleared plots.[8] (In contrast, only seven out of the one hundred and thirty sampled compounds claimed to grow cassava on newly cleared land.) Rather more surprisingly, forty eight percent of sampled compound heads claimed to have planted groundnut on this type of land. A possible explanation for this fact may be that pressure on farm land has resulted in marginal land increasingly being cultivated, where it may previously have been left as bush. Thus, where farmers are aware that a particular parcel of land is not particularly fertile, they may attempt to mitigate this infertility by planting groundnut and other nitrogen fixing crops.

It is interesting to compare cropping patterns on newly cleared land against farmers' choice of crops on freshly fallowed land, in the first year

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7. This corresponds to the Dagomba *'worgu'* farm, described by Akenhead.

8. Apart from a generally lower level of cultivation of yams, other changes that have taken place since Akenhead's account include the replacement of bambara nuts by groundnuts within the Dagomba rotation.

after such fallow. Such a comparison would lead one to suggest that soil breaking pioneer crops are not as important on freshly fallowed as on newly cleared land, and other, nutrient intensive, high value crops are more commonly planted on freshly fallowed land. More specifically, the proportion of surveyed compounds who claimed to have planted sorghum on freshly fallowed land fell to sixty seven percent while the numbers of compounds planting maize rose dramatically to seventy nine percent. The fact that only thirty two percent of surveyed compounds claimed to have grown groundnuts on freshly fallowed land could be interpreted as suggesting that groundnuts may have more value as a ground breaking pioneer crop than as a 'priority crop', *per se.* Finally, a similar proportion (36%) of farmers claimed to have grown yams on freshly fallowed (as on newly cleared) land. (As we previously noted, yams play a much less important role within the farming systems of the study area today than in the pre-independence period.)

Crop rotation practices also play an essential role in the control of weeds and parasitic pests in crops. Runge-Metzger and Albert have carried out a detailed study of various practices adopted by farmers in an attempt to control striga infestation on their land (Runge-Metzger, 1984). One of the findings of this study was that farmers will commonly plant millet on land which has become striga infested. This land will usually then be allowed to return to bush after millet has been grown on it for one or more years. Indeed, our own survey shows that forty six percent of compounds commonly grew millet as their final crop on a parcel of land, before it was allowed to return to bush.[9]

It is clear that farmers within the study area are generally well aware of the nutrient specific requirements of particular crops. Indeed certain crops, such as cassava and millet, are generally thought of as being more tolerant of nutrient depleted soil than others. As part of our survey work, we were able to ask farmers which crops they usually planted on previously cropped land immediately prior to the return of this land to fallow. Again, there appears to be a degree of consistency between farmers with regard to such cropping. Thus, we have seen how forty-six percent of surveyed compound heads claimed to have planted millet on this type of plot (as compared to only a handful who planted millet on freshly cleared or freshly fallowed land). In addition, sixteen percent of surveyed compounds claimed to regularly plant cassava as the final crop before allowing the land to return to the bush. While we would have expected the growing of cassava on exhausted land to have been more widespread, we should point

9. This corresponds to the third year '*Kalsogu*', described by Akenhead.

out that cassava has only recently become a significant crop within the Northern Region.[10] Indeed, historical sources suggest that, while cassava was widely cultivated in southern Ghana in the pre-independence period, this crop was not widely grown by farmers in the northern parts of the country. (We return to examine historical trends in the cultivation of cassava and other crops in the following section of this chapter). Other reasons mentioned by farmers for not growing cassava more widely included problems associated with protecting cassava from damage by grazing goats, sheep and other animals at those times of the year when they are allowed to roam freely.

Perhaps more surprisingly, a significant proportion of farmers claimed also to have grown maize (45%), sorghum (33%) and groundnuts (22%) as the last crop before the land is returned to fallow. We would suggest that this fact be interpreted more as a reflection of economic and other factors favouring the cultivation of these crops than of any particular tolerance by these crops of soil nutrient depletion. Finally, it is highly significant that only two out of the one hundred and thirty surveyed compounds claimed to have planted yams as the final crop before fallow. This would suggest that, in spite of the economic importance of this crop, farmers are aware of the relative low tolerance of yams to soil nutrient depletion. Finally, we should mention that investment of labour in weeding and other tasks is generally much lower on plots which are shortly to be returned to bush than on other plots upon which higher priority crops are being grown. In as much, it is common throughout the savannah belt of West Africa, to come across semi-abandoned cassava plots upon which bush is slowly being allowed to encroach.

While livestock may represent a particularly important store of wealth for the various sedentary peoples of the study area, the keeping of livestock is not generally well integrated into the farming systems of our study area. Thus, no attempt is made to collect and store crop residues for use as animal feed during the dry season. Neither is any systematic effort made to collect manure for use on cultivated plots. Indeed, cattle are often lent out to nomadic Fulani and so may become physically separated from the farms of their owners for much of the year. There are signs, however, that some farmers are responding to a general deterioration in soil fertility by

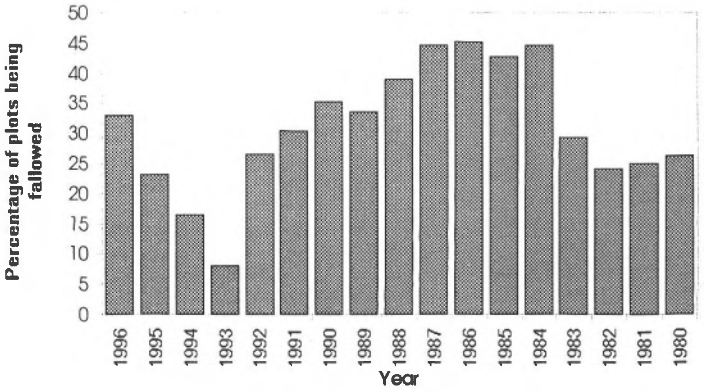
10. According to our survey results, cassava is now the fourth most widely grown crop within our study area (after maize, sorghum and groundnut). This is significant since, according to our plot history data (summarised in section 2.5), as recently as 1980 cassava was cultivated by only a very small number of surveyed farmers.

increasingly growing maize and other priority crops in cattle kraals and on other land which has benefited from animal manuring.

Proportion of farm land allocated to fallow by surveyed farmers

Figure 1 shows the proportion of all plots normally farmed by surveyed compounds which were being fallowed in each year since 1980.

Figure 1: Proportion of farm land under fallow, by year



For analytical purposes, this chart may usefully be divided into (i) the period prior to 1984; (ii) the period from 1984 up to the time at which our own survey was undertaken in 1994, and finally; (iii) farmers plans for the years 1995 to 1996. Looking first at the years prior to 1984, we would be cautious about ascribing undue significance to this data, based as it is on recall by surveyed farmers relating to a period over ten years past. However, we would draw the attention of the reader to the apparent discontinuity in terms of fallow practices between the years 1983 and 1984. We would be fairly confident in stating that this relates to the adoption of an IMF/World Bank sponsored structural adjustment programme in 1983[11], and the serious drought and crop failure affecting the region during

11. The period leading up to 1983 was characterised by a managed exchange rate, subsidised supply of fertiliser by the state agricultural apparatus and generally

that same year. Looking now at the period since 1984, there would appear to have been a generally downwards secular trend in terms of the proportion of farmers' land which was left to fallow in each particular year (reaching a low of eight percent of plots allocated to fallow in 1993).[12]

Since rainfall during this period was characterised by only marginal variation around the mean (with no drought years) we can rule out the possibility that this decline in the proportion of fallow land resulted mainly from climatic factors. Rather, a more likely explanation for this apparent reduction in the proportion of fallowed land is the continued and largely unchecked increase in population density (and associated pressure on available farm land) which has affected the study area in the past decade. Faced with such a shortage of suitable farm land, it would be reasonable to assume that farmers have no choice but to reduce the number of plots allowed to return to fallow.

Unstructured interviews undertaken during our exploratory survey strongly suggest that (a) farmers are aware of a general deterioration in soil fertility over the course of the past decade; (b) farmers are aware of the potential benefits of inorganic fertiliser use, and; (c) the vast majority of these farmers are unable to afford to purchase such fertiliser. Indeed, our formal survey data with respect to fertiliser use confirms that only a very small number of farmers are now using inorganic fertiliser on any of their plots. Faced with a general deterioration in soil fertility, and given their inability to afford fertiliser, it is significant, we would suggest, that most farmers would ideally wish to allocate a higher proportion of their plots to fallow. Indeed, this finds expression in terms of the fact that surveyed farmers did actually allocate a slightly higher proportion of their plots to fallow in 1994 than in the previous year. These farmers also stated that they planned to allocate an even higher proportion of their plots to fallow during 1995 and 1996 than they actually had done during 1993 or 1994. Whether most of these farmers were in fact able to realise these plans is doubtful (except perhaps in less densely populated parts of Salaga and Gushiegu districts), given the shortage of suitable farm land which continues to affect large parts of our study area.

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pervasive state participation in agricultural input supply and marketing.

12. Conclusions relating to the overall extent of land allocation to fallow or particular cropping patterns are based on an assumption that size of farmers' plots have not varied systematically over the period 1980 to 1994.

Historical trends in farmers' crop choice

As part of our survey, sampled compound heads were asked to describe which crops were actually grown by members of the compound on all plots farmed during the current and previous cropping seasons. Since survey information tends to be more useful in terms of answering 'what', rather than 'why' questions, we supplement this basic survey information, where appropriate, with various secondary accounts as well as information collected through unstructured discussions with farmers during the course of our own exploratory survey work. Clearly these different sources of information are complementary and we leave it for the reader to decide what degree of importance they choose to accord them. In an attempt to arrive at certain tentative conclusions relating to changes in cropping patterns in the period since independence, we also make repeated reference to a very thorough review of agriculture in Western Dagomba published in 1957 (Akenhead, 1957). In the absence of reliable quantitative time series data, certain qualitative comparisons are made between our own findings and the detailed descriptions contained in Akenhead's paper. Finally we look at more recent trends in choice of crops grown by farmers by way of reference to our plot history data relating to the period since 1980.[13]

Looking first at our sample as a whole, Table 1 presents information relating to the proportion of surveyed compounds claiming to have grown particular crops during the 1994 cropping season.[14]

Before moving on to examine differences between surveyed compounds with regard to the choice of crops grown we would first wish to make a number of general points, based on the above, aggregated data. Firstly, despite the fact that farmers complain of poor maize yields in the absence of affordable fertiliser, all but one of the surveyed compounds continued to plant traditional or modern maize varieties on at least one of their plots (often the compound farm) during the 1994 cropping season. Nevertheless, repeated anecdotal evidence and various secondary sources would tend to suggest that, since the removal of direct and indirect fertiliser subsidies,

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13. We are aware of the problems associated with the recall of detailed agronomic information relating to previous years. While fully conscious of its potential shortcomings, nevertheless we include such plot history information simply as one additional piece of information, in the absence of more reliable time series data.

14. Ten compounds from the village of Jaanjori, within the Dagomba rural stratum, have been excluded from the analysis due to an unacceptable degree of enumeration error. This leaves a total of one hundred and thirty valid cases.

farmers may increasingly also be choosing to grow other less fertiliser intensive crops such as sorghum, millet and groundnuts. Later in this section we critically assess this proposition, based on an examination of our plot history data for the years 1980 to 1994.

Table 1: Proportion of surveyed farmers growing particular crops in 1994

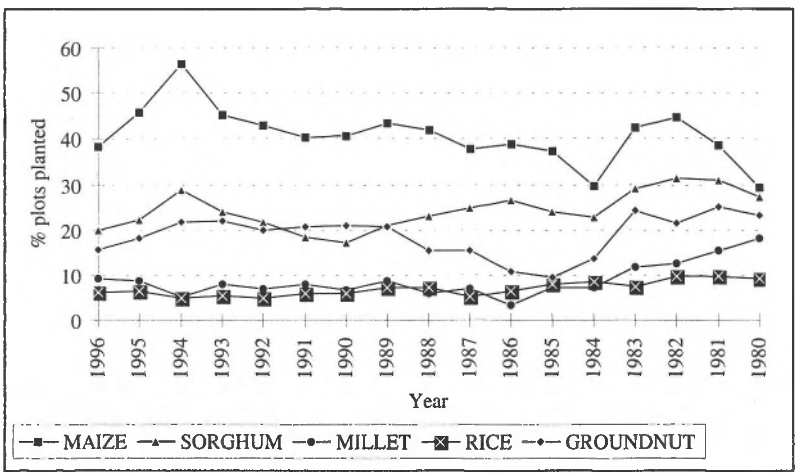
Crop Grown	Number Farmers	(%)
Maize	129	99.2
Sorghum	93	71.5
Millet	31	23.8
Rice	26	20
Groundnut	60	46.2
Cowpea	33	25.4
Pigeon pea	21	16.2
Bambara bean/nut	17	13.1
Other legumes	13	10
Cassava	66	50.8
Yam	71	54.6
Vegetables	10	7.7
Cotton	14	10.8
Total valid cases	130	100

A comparison of Akenhead's 1957 findings with the results of our own survey work would lead one to question the commonly held belief, that the cultivation of maize has only become important in northern Ghana in the postindependence period. According to Akenhead, at the time of writing (in 1957), 'maize in admixture with other crops accounts [at that time] for approximately 48% of the cultivated acreage and may thus be classed together with Millet as the most important cereal crop' within Tamale, Savelugu and the other districts which together comprised western Dagomba. Akenhead goes on to describe in some considerable detail the different types of maize grown in these districts, as well as the various agronomic characteristics of these varieties. He suggests that broadly two types of maize varieties were being widely grown by Dagomba farmers in the 1950's. These are 'the yellow Maize, which is comparatively early maturing and which is the most important variety, and the white Maize which is late maturing and which is generally grown on bush farms'. While

there have been numerous introductions of 'improved' maize composites into northern Ghana over the past decades, nevertheless, our own survey findings suggest that the two varieties described by Akenhead are still widely grown today.[15]

Based on anecdotal evidence alone, one might easily be led to assume that farmers have responded to a well documented deterioration in soil fertility (as well as the removal of fertiliser subsidy) by switching from maize to other less nutrient intensive crops. However, a more rigorous analysis of our plot history data leads one to suggest that the true picture may in fact be much less straightforward. Figure 2 summarises the overall extent of cultivation of maize and other grains (both as mono-crops and inter-crops) by surveyed farmers in each year since 1980. (For the reasons previously discussed, we would again choose to analyse separately data for the periods (i) prior to 1984; (ii) from 1984 to 1994, and; (iii) relating to farmers plans for the years 1995 and 1996.)

Fig 2: Cultivation of grains by surveyed compounds



15. It is highly unlikely, given widespread cross-pollination of modern and traditional maize varieties, that any of these maize varieties are strictly identical genetically to the traditional maize varieties described by Akenhead. Nevertheless, in terms of maturation period, grain characteristics and other physical attributes these varieties do appear very similar to those described by Akenhead. Indeed, farmers continue to refer to certain of these varieties as 'Dagbani' maize.

We would be cautious about ascribing particular significance to the data for the years prior to 1984, being subject, as it is, to a particularly lengthy recall period. However, we would be more confident in stating that the proportion of surveyed farmers' plots planted with maize increased steadily from 1984 up to the time at which the survey was enumerated (in 1994). This is a rather startling finding since it would appear to directly contradict the intuitively much more appealing view, that farmers have responded to increased real fertiliser prices and deterioration in soil fertility by switching away from maize. Likely explanations for this counter-intuitive finding include the possibility that farmers are (i) increasingly growing maize on compound plots and other land that has benefited from human and animal manuring rather than on bush plots; (ii) switching from nutrient intensive to other more tolerant varieties of maize, and; (iii) continuing to grow maize, despite poor (and steadily deteriorating) yields, because of the economic importance of this crop, as well as its central role in household food consumption. Since all three of these suggestions are likely to be true, at least in part, we return to examine these explanations in more detail in subsequent sections of this chapter.

We should also mention that, during the late 1980s and early 1990s, some farmers in our survey area were involved in various maize growing initiatives, sponsored by The Department of Crop Services, IFAD, Global 2000 and various other NGOs. Perhaps the most significant aspect of these maize initiatives is that they all involved the provision of fertiliser to farmers. Indeed, despite the official government policy of removal of fertiliser subsidy, in many cases fertiliser was provided on credit with repayment not being strictly enforced. As a result, many farmers were able to continue growing maize without in many cases having to pay in full for that fertiliser which was provided as part of these various packages. The fact that this implicit subsidisation of maize-fertiliser packages was allowed to continue is likely to have had the effect of delaying any switch to less fertiliser intensive crops which these farmers might otherwise have been forced to consider following the progressive removal of explicit fertiliser subsidies during the 1980s. The situation at the time our survey was undertaken was that few farmers continued to benefit from governmental or non-governmental fertiliser packages (with or without any explicit or implicit subsidy element). In this context, it may be significant that surveyed farmers proposed to plant a much lower proportion of their plots with maize during 1995 and 1996 than they actually had done in 1994.

To summarise, we would characterise the current situation with respect to maize, as follows: (i) Almost all surveyed farmers grew maize during the 1994 season, even within the densely populated farming towns and

villages of Savelugu district; (ii) Maize is considered to be a particularly valuable crop both in terms of subsistence and the generation of income for surveyed compounds; (iii) Farmers are conscious of a general deterioration in soil fertility associated with the shortening of fallow periods and abandonment of shifting cultivation, over the past decades; (iv) Farmers are aware of the nutrient requirements of maize and of the specific inorganic fertiliser requirements of particular maize varieties; (v) Most farmers would choose to apply fertiliser on their maize plots, were they able to mobilise sufficient cash with which to purchase such fertiliser; (vi) Faced with seasonal liquidity constraints and a dramatic increase in the real cost of fertiliser almost none of the surveyed farmers actually applied fertiliser on their maize plots during the past cropping season; (vii) These surveyed farmers are acutely aware of a deterioration in maize yields over the past years but nevertheless choose to continue to grow this crop; (viii) Despite the value placed on maize, deterioration in yields may now have reached such a critical point that farmers may be beginning to act on their long stated intention, to switch to other less nutrient intensive crops; (ix) Alternatively, because of the importance of maize, some farmers may now judge it worthwhile to invest more labour in carrying manure, controlled grazing and other strategies aimed at facilitating an intensification of farming systems, in the absence of affordable inorganic fertiliser.[16]

Much of the rest of this chapter is concerned with critically assessing the last two of these suggestions. We begin by examining the extent to which surveyed farmers have in fact switched to other crops in the period since 1984. Data summarised in figure 2 (above), would again throw into question the extent to which a clear cut switch from maize to other crops has yet taken place within our study area. Indeed, the only crop which has shown anything like a sustained increase in cultivation over the past decade is groundnut. Thus, approximately twice as many surveyed plots were planted with groundnut in the 1994 season, than had been in the 1985 season. However, the apparent significance of this result is somewhat tempered by the fact that groundnut cultivation today is still not as widespread among surveyed farmers as it had been in the years prior to 1984. Later in this section we return to examine longer term trends in the cultivation of groundnuts and other grains and legumes. First, however,

16. Some analysts have speculated that this may result in a commercialisation of maize production. In this scenario, those farmers who are able to mobilise cash would grow maize for sale using fertiliser, chemicals, hired labour and tractor services while other relatively resource-poorer farmers would switch to other less input-intensive crops such as cassava and millet.

we would wish to comment briefly on the extent to which surveyed farmers may have switched from maize to various other grains, in response to the generally perceived deterioration in maize yields over the course of the past decade.

We would begin by noting that (based on data summarised in the above chart) neither millet nor rice appear to have experienced a secular increase in the extent of cultivation by surveyed compounds, in the period since 1984.

As we have seen, the extent of rice cultivation is heavily influenced by localised soil drainage conditions, and the extent of activities of the Nassia Rice Company (and other rice initiatives) within a particular locality. We might, however, have expected to observe an increase in the extent of cultivation of millet over the period in question. While no such increase has in fact taken place, nevertheless it may be significant that surveyed farmers intended to grow millet on a higher proportion of their plots during the 1995 and 1996 seasons. Neither does any single clear picture emerge with respect to the extent of sorghum cultivation in the period since 1984. While the extent of cultivation of sorghum among surveyed farmers declined in each year up to 1990, these same farmers have since planted a steadily greater proportion of their plots with sorghum in each year since 1990. One possible explanation for this reversal is that removal of direct fertiliser subsidies and increased nominal cedi fertiliser price (associated with depreciation in the cedi/$ exchange rate) have only recently found physical expression in terms of a reduction in fertiliser use by farmers in the period since 1990. This would not, however, explain why surveyed farmers stated their intention to plant a lower proportion of their plots with sorghum during the 1995 and 1996 cropping seasons. To sum up, there appears to be no convincing evidence, based on our plot history data alone, to suggest that farmers have yet shifted from maize to other less nutrient intensive grains in response to a perceived deterioration in soil fertility. However, later in this section we present strong evidence which does suggest that many farmers have responded to a deterioration in soil fertility by increasing the number of plots upon which cassava is planted.

Before moving on to examine data relating to the extent of cultivation of root crops, we first briefly examine certain longer term trends in the cultivation of maize, sorghum, millet and other grains in the period since independence. As we have already noted, maize was widely cultivated by farmers in the pre-independence period. We have also seen that all but one of our surveyed compounds claimed to have grown maize during the 1994 cropping season. Indeed, during the 1994 season, more than half of all plots over which these compounds had usufruct rights were in fact planted with

Table 2: Land use, by year

	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984
MAIZE	38.4	45.8	56.5	45.3	42.8	40.4	40.6	43.3	41.8	37.8	38.7	37.2	29.7
SORGHUM	19.8	22.1	28.9	24	21.7	18.4	17.1	20.9	22.9	24.8	26.5	23.9	22.6
MILLET	9.2	8.7	5.1	7.9	6.8	8	6.7	8.7	6	6.8	3.4	7.2	7.1
RICE	6.1	6.3	4.8	5.4	4.9	5.9	6	7.2	7.2	5	6.4	7.8	8.4
GROUNDNUT	15.5	18.1	21.7	22	19.9	20.6	21	20.6	15.3	15.3	10.8	9.4	13.5
COWPEA	4.9	5.9	4	6.6	3.9	5.1	5.7	6.9	6.4	6.8	7.8	7.2	9
PIGEON PEA	7.4	7.3	8	6.6	6.6	7	5.4	3.2	2.8	2.3	3.4	3.3	1.9
BAMBARA	0.2	0.4	0.8	2	0.6	0	0	0	0	0	0	0	0
OTHER LEGUMES	0.6	1	1.7	2.3	1.2	0.8	0.3	0.4	0.4	0	0.5	0	0
CASSAVA	10	9.1	8.9	10.9	7	4	1.9	2.5	0.8	2.3	1.5	1.1	1.3
YAM	2.2	3.7	4	15.6	6.4	8.6	4.8	4	5.6	3.2	4.9	9.4	7.7
VEGETABLES	0.8	1.4	3.4	5.7	2.7	1.9	1.9	2.2	0	0	0	0	0
COTTON	0.8	1.2	1.5	2.5	2.5	0.5	0.6	0	0.4	0	0	0	0
FALLOW	33.1	23.1	16.5	8.1	26.4	30.5	35.2	33.6	39	44.6	45.1	42.8	44.5
OTHER	0	0	0	0	0	0	0	0	0.4	0	0.5	0.6	0

maize. Given that fifteen percent of these plots were being fallowed in that year, we may deduce that approximately two thirds of all plots *actually cultivated* during 1994 were planted with maize. This compares with forty eight percent of cultivated acreage which Akenhead estimated was planted with maize in 1957. Based on this (admittedly imperfect) comparison, we would tentatively conclude that the cultivation of maize is likely to be at least as important, if not more widespread, today than in the pre-independence period.

In contrast, sorghum would appear to have undergone something of a decline in popularity within our study area in the post-independence period. According to Akenhead, as much as forty one percent of cultivated acreage was planted with sorghum in 1957. Even taking account of the fact that our own plot history data covers plots being fallowed, the proportion of cultivated plots planted with sorghum was considerably lower than forty percent in every year since 1980. Likely explanations for the apparent decline in popularity of sorghum include (a) the increasing popularity of various modern maize composites among farmers in this period; (b) the continued and largely unchecked problem of striga infestation of sorghum, particularly in upland areas, and; (c) a reduction in the proportion of virgin land being cleared for cultivation has effectively removed the need to plant sorghum as a soil-breaking pioneer crop on a greater part of farmed land.

Even more striking has been the decline in popularity of millet throughout our study area in the post-independence period. Akenhead suggests that millet 'must be classed with maize as the most important cereal crop in the Dagomba farming system' in the pre-independence period. Indeed, Akenhead estimates that, in 1957, fifty two percent of cultivated acreage was planted with millet. In stark contrast, in no year since 1980 were more than eighteen percent of our own surveyed farmers' plots planted with this crop. (Indeed, since 1984, never more than nine percent of surveyed farmers' plots were planted with millet). Again, this is likely to relate in large part to the increased popularity of maize varieties among farmers in the period since independence. However, as we have seen, millet does continue to play a role in the farming systems of the region, particularly as a striga resistant, poor soil tolerant and drought resistant crop.[17] Indeed, we might speculate that surveyed farmers' stated intention to plant a higher proportion of their plots with millet in 1995 and 1996 (described earlier) could translate into a future resurgence in importance of this crop within our study area.

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17. Millet cultivation tends to be more widespread in upland areas, where striga infestation is more common.

Turning now to rice, secondary sources suggest that this crop is becoming ever more important for farmers within the Northern Region, particularly as a cash crop (Albert, 1992). According to Akenhead, in 1957, rice was 'a relatively unimportant crop... it has no specific place in the Dagomba rotation and its distribution is limited to the small areas of cultivated swamps'. He goes on the argue that rice 'enters very little into the dietary of the Dagomba and is grown largely as a cash crop. Its distribution is limited and it is generally found in areas adjacent to big markets'. According to our own survey data, within certain of our surveyed settlements (such as Gushiegu town) a significant proportion of surveyed compounds claimed to have planted one or more plots with rice during the 1994 season. However, as we previously noted, the cultivation of rice is particularly unevenly distributed within our study area. Thus, in other surveyed settlements we find that rice is hardly grown at all.

Secondary sources suggest that rice is much more widely consumed in northern Ghana today, by those who are able afford to purchase it, than would appear to have been the case at the time that Akenhead wrote his paper. Indeed, (while consumption of rice may be particularly widespread within the towns and cities) there is no reason to believe that a switch from other staples to rice is a purely urban phenomenon. Since a large part of that rice consumed in Ghana is imported from Vietnam and other countries, agricultural policy in the post independence period has tended to focus on the potential for growing rice locally, as an import-substitution crop. Indeed, a number of feasibility studies were undertaken during the 1960s and 1970s with the aim of assessing the prospects for irrigated cultivation of rice in northern Ghana. Despite the construction of a number of small and medium scale irrigation schemes, the majority of rice grown in northern Ghana today is still planted on swamp land, according to the traditional method. However, the incidence of rice cultivation within our own study area today remains highly localised.

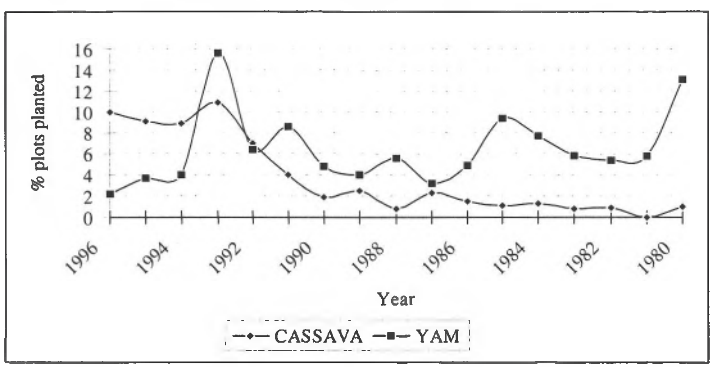
According to Akenhead, prior to 1945 'cassava was a relatively unimportant crop'. Earlier in this section we noted that cassava may increasingly be being cultivated in those parts of the study area in which pressure on land has resulted in a shortening of fallow periods.[18] Indeed, even as early as 1957 Akenhead sees fit to mention that cassava 'has assumed more importance now [1957] due to poorer yam crop'. As

18. Evidence from The Gambia, and other more densely populated parts of the Guinea savannah zone of West Africa, would suggest that cassava may indeed play a valuable role in more intensive bush fallow farming systems, particularly in the absence of fertiliser.

previously mentioned, farmers perceive yams to be less tolerant of poor soil nutrient conditions than cassava. Indeed, during the course of our exploratory survey interviews, farmers repeatedly stated that, for this reason, cassava was being more widely cropped today than in the past. Many farmers also suggested that, whilst they had previously grown yams, this was no longer the case. Our own detailed plot history data (summarised in the following chart) lends strong support to these suggestions.

It is immediately apparent, from Figure 3, that cassava has indeed undergone a dramatic increase in popularity among surveyed farmers, particularly over the past five years. Again, this is likely to relate to genuine agronomic advantages of this crop (particularly in terms of drought and low-nutrient tolerance), and increased focus on this crop by the national and regional agricultural research system. In contrast, the proportion of plots planted with yam has tended to vary greatly from year to year around a generally downward secular trend. Thus, in 1994, only four percent of surveyed farmers' plots were planted with yams, while nine percent of these plots were planted with cassava.[19]

Figure 3: Cultivation of root crops by surveyed compounds



We cannot over-stress the significance of this finding, particularly since yams have traditionally played a central role in production and

19. However, we should point out that, according to Runge-Metzger, cassava plant densities may be lower than for other crops. This is because cassava may be planted on poor land on which other crops have failed to thrive, and as a border crop only. (In Runge-Metzger & Diehl, 1993)

consumption for the Dagomba and other peoples of the study area. Earlier in this section, we noted the important role that yams played in the Dagomba rotation system, during the pre-independence period. Indeed, in 1957, Akenhead estimates that 'yams in admixture with other crops occupy approximately 25% of the cultivated land'. In stark contrast, our own detailed plot history data shows that, at no time since 1980 have the proportion of plots upon which yams were planted even remotely approached twenty five percent. (This remains true even when account is taken of those plots being fallowed by surveyed farmers during a particular year.) The final compelling evidence that cassava is in fact replacing yam as the dominant root crop within the study area comes from surveyed farmers' stated future intentions with respect to cropping patterns for the years 1995 and 1996. Thus, according to our detailed plot history data, summarised in the above chart, these farmers intended to increase (to 10%) the proportion of their plots planted with cassava while further reducing the number of plots planted with yam to a negligible two percent.[20]

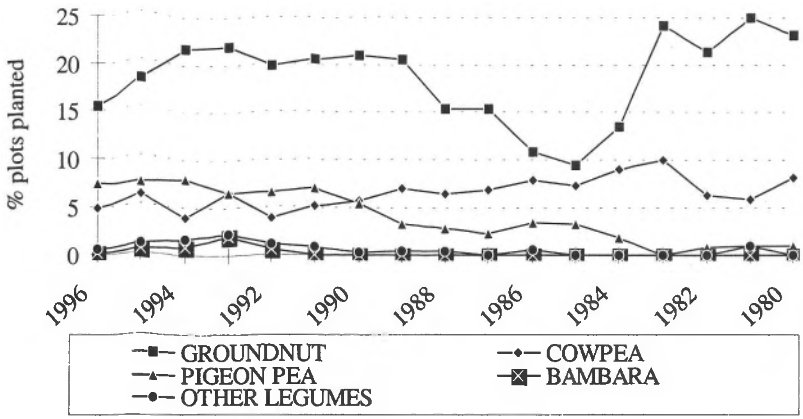
According to Akenhead, in the pre-independence period yams represented 'the most important root crop in the native dietary', while cassava was 'seldom eaten by the Dagomba except when there is a food shortage'. While yam is still the favoured root crop in terms of consumption, it would be fair to say that, in many parts of the Northern Region today, the greater part of calorie consumption from root crops is now derived from cassava. Indeed, recent consumption studies undertaken by Savannah Agricultural Research Institute (SARI) economists suggest that cassava now provides a significant percentage of the total calorie intake in many settlements surveyed within the Northern Region. Pending the analysis of our own consumption survey data, we would tentatively suggest that cassava is becoming the staple root crop for the average rural family.

Turning now to legumes, according to Akenhead's 1957 survey data, 'the groundnut crop by itself or in admixture with other crops occupies some 11% of the cultivated area. It cannot be classed, therefore, as an important crop, although most farmers grow a certain proportion of it in their farms.' Our own survey data would suggest that groundnuts have subsequently come to play a much more important role in the farming systems of the Northern Region, in the period since Akenhead published

20. As we previously noted, in other parts of the Northern Region, a higher proportion of farmed land is still planted with yams. This is particularly the case in the areas around Bimbilla and in parts of Salaga and Gushiegu districts.

his survey. Thus, just over 46% of surveyed compounds claimed to have grown some groundnuts during the 1994 cropping season. Indeed, in this year farmers claim to have planted twenty two percent of their plots with groundnuts. Thus, taking account of those plots under fallow, this translates as over a quarter of all cultivated plots having been planted with groundnut during the 1994 cropping season (Figure 4). The true significance of this finding only becomes clear when we compare historical trends in the extent of cultivation of groundnut, bambara nut and other leguminous crops.

Figure 4: Cultivation of legumes by surveyed compounds



Unstructured interviews conducted as part of our exploratory survey confirm that farmers are generally well aware of the potential benefits for soil fertility of growing leguminous crops. Indeed, historical sources would tend to suggest that indigenous legumes have long played an important role in the farming systems of northern Ghana. Thus, according to Akenhead, in the pre-independence period 'Bambarra Beans [also known as bambara nuts] by themselves or in admixture with other crops account for approximately 13% of the cultivated acreage and may be considered a more important crop than Groundnuts.' Since bambara nuts and groundnuts occupy the same role within the Dagomba rotation, it is particularly interesting to compare the extent of cultivation of these two crops. Thus, it is highly significant that, according to our own survey, many more farmers today grow groundnuts than bambara nuts. Indeed,

only seventeen out of the one hundred and thirty surveyed farmers claimed to have planted any bambara nuts at all during the past cropping season (compared to sixty who claimed to have planted groundnuts). Possible explanations for the apparent decline in bambara nut cultivation (in relation to groundnuts) are (i) a well developed market for groundnuts throughout West Africa finds reflection in generally higher prices for groundnuts, than bambara nuts, in the local markets of the study area; (ii) a great deal of research effort has focused on developing 'improved' groundnut varieties. In contrast, bambara nuts and certain other legumes appear to have been relatively neglected by the international and national research institutions; (iii) particular varieties of 'improved' or 'traditional' groundnuts may genuinely have agronomic advantages over bambara nuts, particularly in the face of rainfall variability and deterioration in soil fertility; (iv) consumption and cooking preferences may favour groundnut varieties over bambara nuts, and; (v) the difficult task of processing bambara nuts is a skill possessed only by the older generation.

Focusing now on more recent trends in terms of bambara bean cultivation, it is rather striking that none of our surveyed compounds claimed to have planted bambara nuts on any of their plots in the years from 1982 to 1991. It is interesting, however, that a number of these compounds did return to cultivating bambara nuts in the 1992, 1993 and 1994 cropping seasons. It remains too early to state with any degree of confidence whether this should be regarded as the beginning of a sustained resurgence in the cultivation of bambara nuts within our study area, or simply a reflection of particular bambara nuts initiative which may have been introduced in these years. (We would note, however, that during the course of our exploratory survey interviews a number of farmers stated that they valued bambara as being a crop that can be planted towards the end of the rains.)

Akenhead describes the important role that different varieties of cowpea played within the farming systems of Western Dagomba in the pre-independence period. Since independence, a great deal of research effort by SARI and other research institutions has focused on cowpea, particularly as an inter-crop or relay crop with maize (Hardter, 1991, cited in Runge-Metzger & Diehl, 1993). During the course of our exploratory survey interviews farmers repeatedly mentioned cowpeas as playing an important role in their farming systems. Specifically, (60 day) early maturing varieties of cowpea were mentioned as an important 'hunger crop' in that period before maize and other grains had been harvested. It is rather perplexing, therefore, to find that although about a quarter of surveyed farmers claimed to have grown some cowpea during 1994 less than five percent of surveyed compounds' plots were actually planted with

cowpea in that year. Indeed, based on our plot history data (summarised in figure 4, above) it would appear that the proportion of all plots planted with cowpea has in fact declined steadily since 1983. One possible reason for this apparent decline is that, in the absence of affordable pesticide, only very limited progress has yet been made in developing and extending to farmers varieties of cowpea which are truly resistant to a range of local insect pests.[21] Consequently, total loss of cowpea crop to insects remains a common occurrence throughout northern Ghana. Within our own study area, a package of improved cowpea varieties, chemicals and sprayers was widely disseminated to farmers under heavy subsidy from IFAD and the Government of Ghana during the late 1980s. However, with the introduction of the T&V extension system within these districts in 1992, this package was abandoned and farmers were left to make their own arrangements with regard to procuring pesticide. The current situation throughout our study area is that very few farmers are able to afford to purchase pesticide for use on cowpea or other crops. As a result, losses to insect pests remain high. We would, therefore, conclude that, despite its important role has a hunger season crop, most farmers today see cowpea principally as a useful secondary crop rather than a priority crop in its own right.

In contrast to cowpea, surveyed farmers appear to have planted an ever higher proportion of their plots with pigeon pea over the course of the past decade. According to Akenhead's 1957 survey, pigeon peas 'occupy a very small percentage of the cultivated acreage. They are seldom planted as a pure stand, but generally singly along farm and field boundaries'. However, he goes on to suggest that 'they have definite value in that they are drought resistant and produce heavy crops of seed and leaves.' Even as recently as the early 1980's, only a small proportion of our own surveyed farmers' plots were planted with pigeon pea. However, since 1983, the proportion of these plots planted with pigeon pea has steadily increased, to reach an apparent all time high of seven percent in 1994.

The likely explanations for this increase are twofold. On the one hand, as Akenhead points out, pigeon pea does have genuine agronomic advantages over other crops. In particular, following the severe drought of 1984, farmers are likely to have placed particular value on the drought resistant qualities of this crop. In addition, high levels of utilisable nitrogen in pigeon pea leaf fall and crop residue would tend to make this a particularly attractive crop in areas where soil nitrogen depletion has become a chronic problem. Indeed, as we previously mentioned, farmers are generally well aware of the

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21.Thrips in the field and *callazobruchus maculatus* in storage.

beneficial properties of pigeon pea and other legumes in terms of offsetting a general deterioration in soil fertility. The second likely reason for the apparent increase in cultivation of pigeon pea by surveyed farmers is that this crop has tended to receive particular attention from the national and international research institutions over the past decade. Indeed, a number of governmental and non-governmental initiatives aimed at encouraging the cultivation of pigeon pea by farmers have been implemented in northern Ghana over this period. In particular, pigeon pea cultivars have been widely disseminated throughout our study area as part of a broader agro-forestry package. We would conclude, therefore, that increasing interest in this crop by the agricultural research institutions can only auger well for farmers in northern Ghana. In as much, there is clearly also an important adaptive research role to be played by SARI and other national research institutions, in terms of this and other relatively neglected but potentially valuable crops.

Finally, before moving on to look at cotton and other crops, we would note that a small but steadily increasing number of surveyed farmers claimed to have planted some of their plots with 'other legumes' in the years since 1988. Attempts have been made by SARI to introduce soya bean germplasm (developed by IITA and INTSOY) into northern Ghana. In relation to these efforts, we would simply note that, while soya beans have not traditionally been cultivated by local farmers, all the signs are that the popularity of this crop could easily spread as rapidly as groundnuts, cassava and other recent introductions.

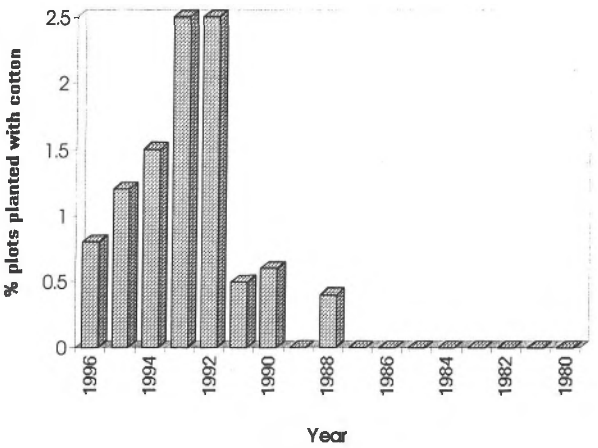
Turning now to cotton, Akenhead documents that, as long ago as 1910, efforts were made by the Department of Agriculture of the then Northern Territories to develop this crop through 'a comprehensive scheme of cotton seed distribution coupled with the erection of a cotton gin and bailing press in Tamale'. However, according to Akenhead, 'this scheme was a failure due to the lack of interest by the local farmer, the low yields obtained per acre and the high freight charges involved in despatching baled cotton to the Kumasi railhead'.[22] Since these early efforts, numerous attempts have been made to encourage the cultivation of cotton in northern Ghana. None have met with more than partial success, in terms either of the adoption of this crop by farmers, or the profitable marketing of the crop, without heavy government subsidy. Since independence, the cotton marketing parastatal

22. Colonial initiatives aimed at encouraging farmers to grow cotton were met with rather more success in other parts of the West African savannah. This is particularly the case in Francophone West Africa, where a much more interventionist state approach to the contract growing and marketing of cotton finds expression in terms of a much higher levels of cotton cultivation in these various countries today.

has been plagued by a host of technical and managerial problems culminating in the non-payment of farmers for contracted cotton. As a consequence, very few farmers have since been willing to grow any cotton.

As part of the IMF sponsored ERP, in 1985, the cotton parastatal was privatised to form the Ghana Cotton Company. More recently, various privately funded cotton enterprises have set up in business in Tamale, in competition with the GCC. These companies are now vigorously trying to encourage farmers to grow cotton throughout the Northern Region. Despite these recent initiatives, only a very few compounds situated within certain of our surveyed settlements claimed to have grown any cotton at all during the 1994 season. Possible explanations for this fact include (i) continued suspicion among farmers of contract growing of cotton resulting from non-payment by the cotton parastatal (prior to privatisation); (ii) the geographically uneven and highly localised activities of both the Nulux and Ghana Cotton Companies; (iii) agronomic and socio-economic factors favouring the cultivation of other traditional priority crops by farmers, and; (iv) the highly nutrient-intensive nature of cotton prevents this crop from being planted on nutrient-depleted land (except with high levels of inorganic fertiliser use). We would also note that cotton growing remains highly localised, throughout the study area. Thus, compounds surveyed within the villages of Tibale, Kpelung and Jaanjori (within Savelugu district) as well as Savelugu and Gushiegu towns were found to have grown at least some cotton during the 1994 season. In contrast, none of those compounds sampled from either Salaga town or Nyamalga (within Salaga district) claimed to have grown any cotton at all during the 1994 season. This is simply a reflection of the current geographic focus of the two cotton companies and we see no reason why cotton should not also be technically and economically viable in these and other parts of the Northern Region. An examination of our plot history data (summarised in Figure 5) confirms that never more than three percent of surveyed farmers' plots were planted with cotton in any year since 1980.

Figure 5: Cultivation of cotton by surveyed compounds



While we would be cautious about attempting to identify statistically significant trends based on such a small number of cases, nevertheless, we would make a number of more qualitative points in relation to this data. Firstly, it is significant that no cotton was grown by surveyed farmers in the years from 1980 to 1987. Again, this is likely to relate to the generally poor performance of the state cotton parastatal, prior to privatisation, and farmer reluctance to grow cotton as a result of previous non-payment by the cotton parastatal. The fact that some farmers have subsequently decided to grow cotton, despite these reservations, is likely to relate in large part to the activities of a small number of highly motivated staff within the various cotton companies over the past few years.[23] It remains too early, however, to state with any degree of confidence what the prospects are for this crop in northern Ghana. This is particularly the case since surveyed farmers claim to have planted a lower proportion of their plots with cotton during the 1994 season than they had done during either 1993 or 1992. Even more significantly, these farmers stated that they intended to further reduce the

23. During the course of exploratory survey interviews, farmers repeatedly mentioned the active role taken by the Nulux Cotton Company agronomist, Dr Saluma, in encouraging farmers to grow some cotton. Apart from providing required inputs, Nulux have at times also provided cash loans and even hired labour to weed farmers cotton plots, in an attempt to encourage farmers to continue growing cotton.

number of plots planted with cotton during 1995 and 1996. In short, most surveyed farmers appear reluctant to invest time or money in an, as yet unproven, crop which has never been central to their livelihood strategies.

Despite the ambiguous nature of our own survey data, evidence from other parts of the savannah zone of West Africa would cause us to be cautiously optimistic that, given the right conditions, cotton could play an important role in the farming systems of northern Ghana. Broadly speaking, two quite contrasting approaches have been adopted in an attempt to develop cotton as a cash crop within the region. At one extreme stands the Francophone approach, in which the state (acting through particular 'Societees') takes an explicitly interventionist role in all aspects relating to input supply, agronomic advice and marketing. In contrast, private sector approaches have tended to be more common within Anglophone West Africa. What both state and private sector approaches have in common is their interlocking-holistic approach to providing inputs, ploughing services, advice and marketing. Both approaches clearly have their strengths and their weaknesses. However, given the current free market emphasis in Ghanaian government policy, only the private sector approach would appear to represent a realistic option within northern Ghana today.[24]

Summary and conclusion

(i) Farming systems of the study area are characterised by a detailed knowledge of local climatic, soil fertility and drainage conditions by surveyed farmers. Surveyed farmers were also found to have an intricate understanding of the nature of various weed, insect and disease problems affecting agriculture within the area. Given the resource constraints faced by these farmers, it is concluded that the farming systems of the study area have represented a generally effective adaptation to the specific environmental conditions faced by farmers, particularly in the pre-independence period.

(ii) Rapid and sustained increase in population in the post-independence period has placed these farming systems under stress. More specifically, localised pressure on suitable farm land has resulted in a shortening of

24. Since the introduction of the ERP, Ghanaian government policy has increasingly encouraged the creation of an 'enabling environment' in which the market is allowed to operate as free from government intervention as possible.

fallow periods and the abandonment of the traditional shifting cultivation systems. In most parts of the study area a more intensive bush fallow or rotational system is now the norm. In addition, marginal land is increasingly being brought into cultivation in these more densely populated areas. It is suggested that the current situation with respect to the sustainability of these farming systems is now critical.

(iii) Surveyed farmers are aware of a general deterioration in soil fertility over the course of the past decades. During the 1970s and early 1980s many farmers were able to partially offset specific soil nutrient depletion through use of inorganic fertiliser (which was widely available throughout the study area at heavily subsidised prices).

(iv) Since the implementation, in 1983, of the Economic Recovery Programme, progressive removal of fertiliser subsidies and devaluation of the exchange rate have resulted in a sharp real increase in the cost of fertiliser throughout our study area. More recently, fertiliser supply has also been privatised.

(v) Surveyed farmers claim to have reduced their usage of fertiliser over the course of the past decade. Indeed, many surveyed farmers now claim either to be unable to afford or to mobilise cash with which to purchase fertiliser. Our own survey data confirms that the majority of surveyed farmers applied no fertiliser on most of their plots during the 1994 cropping season.

(vi) Neither are most surveyed farmers able to afford or mobilise cash with which to purchase herbicide or pesticide, despite substantial yield loss resulting from weed competition, plant disease and pests.

(vii) Surveyed farmers complain of steadily declining yields, particularly of maize, over the course of the past decade. Most of these farmers attribute this recent deterioration in yields to an inability to afford inorganic fertiliser.

(viii) Despite forced changes in land use patterns (particularly in terms of a reduction in fallow periods) most surveyed farmers have not yet responded to increasing pressure on suitable farm land by developing or adopting technologies which might assist in the sustainable intensification of land use systems.

(ix) Further, it is suggested that, contrary to received wisdom, many of those varieties currently being grown by surveyed farmers today are not in fact

recent introductions but are descendants of varieties already being widely farmed in the pre-independence period. In particular, historical sources suggest that various yellow and white maize varieties were already being widely grown by farmers in the pre-independence period.

(x) However, where truly attractive agricultural technologies have been introduced, surveyed farmers have shown themselves quick to adopt these. Thus, various maize composites, cassava, cowpea, groundnut and pigeon pea introductions have been enthusiastically received by farmers over the course of the past decades. Indeed, surveyed farmers also show themselves to be active innovators when they can see the likely benefit in terms of their own particular livelihood strategies of such innovation.

(xi) While some modern varieties have been widely adopted by farmers, the majority of surveyed farmers recycled own seed and other traditional and modern planting material for use during the 1994 cropping season.

(xii) Despite widespread anecdotal evidence suggesting that farmers intend to switch from maize to other less nutrient-intensive crops (in response to a deterioration in soil fertility), this suggestion receives little support from our detailed plot history data for the period since 1980. However, this data does clearly demonstrate that cassava has replaced yam as the dominant root crop within the study area over this period.

(xiii) It is concluded that deterioration in maize yields may now have reached such a critical point that some farmers may be beginning to act on their long stated intention to switch from maize to other less nutrient-intensive varieties.

(xiv) Alternatively, due to the central role that maize cultivation plays in the livelihood strategies of surveyed farmers, some farmers may now judge it worthwhile to invest labour and other scarce resources in managing crop residues, animal waste and other measures aimed at intensifying land use systems.

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7
Bush Fires and the Domestication of the Wild in Ghana

Jon Kirby

African crisis

1983 and 1984 will go down in West African history as one of the worst periods ever for drought and famine. But besides hunger it is also to be remembered in Ghana for the devastating bush fires that destroyed thousands of hectares of cocoa farms, food crops, oil palm, sugar cane, coconut, eucalyptus, rubber and coffee plantations, not to mention thousands of square km of forest, already harvested and bagged grain, and both animal and human life.

It is hard for one who has not seen it to visualise the utter destruction caused by a 'bush fire' in the 40 plus degree heat of the 'dry-season' (January to May). Crackling dry vegetation is turned to cinder in seconds and hardwoods such as the acacia, locust bean and shea-nut smoulder for days before toppling. The aftermath looks like the Maginot line or eerie moonscape, and the effects are getting worse every year.

Although there has been no in-depth study of the 1983 fire detailing the extent of the damages or their long or short range effects, the headlines in Ghana's newspapers signalled a national disaster:

> Three killed at Nsawre' (PDG March 9).
> '2,000 hectares of food farms destroyed at Begoro' (PDG Feb. 21).
> '360 hectares of sugar cane destroyed at Asutsuare' (PDG Jan. 26.).
> '1,000 people homeless; crops destroyed at Odumasi-Ashanti' (GT March 11).

In the wake of public concern and outrage came calls for 'something to be done about indiscriminate burning' and stricter laws against offenders. But up until now no serious effective measures have been undertaken to prevent another incidence of this destruction. It is not unusual for the people of Ghana to forget all about such events when the crisis is over. Similar outcries were heard after the 1972–3 dry season fires but nothing came of it. In the 1987 dry-season the northern savannah was more charred

than it was in the crisis year yet nothing was done to prevent the incendiary destruction. Now in the 1998 dry season the entire northern savannah is blacker, smokier, drier and bleaker than it was a decade ago. The lack of any effective or appropriate action despite the rhetoric would seem to indicate that most people don't seem to consider it to be much of a problem or that prevention involves more than meets the eye of the casual observer.

Focus on attitudes

This paper will not try to refute the use of fire in conjunction with swidden adaptive strategies within still manageably unpopulated areas, nor will it enter into the ongoing discussion over the relative usefulness of selective, controlled, or managed burning versus the wholesale uncontrolled destruction which we witness every year. It will be presumed that the reader is already convinced that the indiscriminate bush-burning is destroying northern Ghana. We will support Albin Korem (1985) and a growing body of commentators on the proposition that the annual total conflagration of the North coupled with the current state of overpopulation and soil degradation has done irreparable damage to the environment and is seriously affecting the quality of life here in Ghana. Nevertheless, in spite of the obvious and terrible consequences of bush-burning, aside from periodic condemnation by successive governments, there is no effective programme to deal with the problem – nor has there ever been. We will be concerned with why this is so, why this persistent gap between understanding and preventative action, and what can be done to change this.

We mention only in passing the wider issues related to degradation, such as the agricultural policies of the 1960s and '70s which fostered agricultural expansion – especially by offering imported chemical fertilisers and farm machinery at subsidised prices – at the expense of Northern ecology and generally to the disadvantage of the subsistence farmer. Population growth and movements also played their part. Throughout the '80s and into the '90s, while Ghana was slowly moving out of the depression caused by high-level corruption in the '70s, the population nearly doubled encouraging the massive flight of youthful farmers to the urban centres and beyond. These broader issues are too numerous to be included here and they have already been treated elsewhere to some degree (see Shepherd 1978a, 1978b).

Our main focus will take us to a more neglected area – the less visible but more basic attitudinal reasons for bush-burning. Our explorations will

enter the realm of symbolic imagery – the ways in which the issues are treated in the symbolic imagination of those who set the fires. Ghana's ecology is an arena dominated by development economists and forestry experts where the idiom of social and cultural psychology is rare. Nevertheless it deserves a hearing. The so-called 'fuzziness' of cultural thinking versus the 'hard facts' of scientific thinking is in itself a symptom of the deeper problem underlying the nation's inability to deal appropriately with the bush-burning phenomenon.

It will be proposed here that bush-burning, as we find it in northern Ghana, is not social psychosis, nor is it a technical or engineering problem, nor is it a matter of individual knowledge or choice. One can be convinced of the illogic of burning and yet continue burning. Educational campaigns have been tried and have failed. They are not the answer. Fire-fighting equipment and brigades are available and although they are used quite creatively haul water or parade supporters at political rallies, they not used against the fires. At the core of the 'bush-burning' phenomenon there is a cultural problem, the epistemological underpinnings of which have not yet been seriously examined either by Western institutions for 'development' or by their African counterparts.

The problem is one of interpretation. Today's global institutions for ecological management, including those of the Ghanaian government, continue to assign different meanings and interpretations to 'reality' than the people living in Ghana's northern villages. The fact that this interpretative gap has not yet been bridged at local levels supports a parallel approach to ecological problems – Western solutions for 'White man's palaver' versus African solutions for 'Black man's palaver'. Western solutions are officially maintained at the higher echelons of the bureaucracy while unofficially, it is the 'African solutions' that continue to hold sway at the local level.

There are two strong Western cultural biases maintaining this parallelism – scientific materialism and individualism. The near-global perspective of scientific materialism now dominates the interpretation of all reality. When it comes to their own local level 'African problems', however, Ghanaians experience a dissonance between the interpretation of life that proceeds from their cultural traditions and the empiricism implicit in global institutions of prestige and power. The gap between the parallel institutions leads to such anomalies at the national level as putting the management of a tropical eco-systems into the hands of forestry experts trained at Aberdeen and at the local level as leaving the ecological task to local fire departments – whose fire engines, donated by ecologically-minded Northern countries, have had more experience selling water at cut-throat prices than fighting bush fires – and to occasional tree-planting

campaigns designed more to capture votes than to conserve the soil. Those in charge of solving the problems dare not view them from the people's perspective, for this is the very thing that must eventually be destroyed. Their views are judged as embarrassingly 'not real' or 'primitive' because they do not fit the scientific materialistic bias of our modern world. The general feeling is that all of this 'backwardness' will gradually disappear with time and education. But this approach reveals a bias that is blocking development, for one must begin by acknowledging and understanding the culture gap before bridging it.

The second bias is toward individualism. The African reality is social rather than individual and matters related to human ecology are not a question of personal belief, much less personal choice. In northern Ghana one may choose not to believe in witchcraft and still may be accused or witness one's wife murdered or carted off to a 'witch village', or one may suffer misfortunes which others attribute to witchcraft and thus be drawn into its destructive web. Educated Ghanaians who return to their regions to do local development are few but even they do not usually last very long because they have the impossible task of trying to harmonise the two realities single-handedly. The Western individual bias effectively blocks social action and transformation by not recognising or affirming the importance of the existing social reality.

In attempting to view the scene from the villager's perspective, we will use the ethnographer's emic approach and, though we will initially draw from Gold Coast colonial records to underline past failures to control the rampant fires, we will mostly draw our examples from the last decade. We will examine the way a northern Ghanaian society, the Anufo, use fire to control the 'wild'. The dualistic cultural theme of the 'domestic' or the 'house' versus the 'wild' or the 'bush' will help us to interpret the epistemological foundations for bush-burning. We will note the ways in which their cultural 'knowledge' is exercised and passed on, and attempt some suggestions for a responsible dialogue leading to change.

Early policies toward bush-burning

The disastrous effects of bush-burning in Ghana have been understood for quite some time. As far back as 1922 T.F. Chipp comments on the effects of bush-burning on 'savanaisation': 'Thus with man's assistance, aided by the great annual fires that sweep through the Sudanese Zone grassland, and desiccating influences of the Harmattan, the forest is steadily receding. . .' (cf. Korem 1985: 97). In 1934 there were serious attempts to stop bush-burning in the 'Northern Territories', as it was then called. Again in 1936

and 1937 laws were enacted and enforced to control bush-burning in the North. Laws against burning grass and vegetation were passed in the Lawra, Kassena-Nankanni, and Mamprusi areas. The Native Authorities periodically passed by-laws to prevent grass burning or wilfully firing standing vegetation throughout the 1930s and 40s. In 1947–8, 1,920 persons were fined for illegal burning in the Bawku district and in 1951–2 there was a marked decrease in illegal fires in the Mamprusi and Yendi districts (cf. Korem 1985: 160). There were also periodic campaigns like the one reacting against the destruction of the mango plantation in Detoyili near Tamale in 1972 in which the Ministry of Information cinema van visited 436 villages in 'retaliation', but their effectiveness was questionable. All considered, in the past there was at best only sporadic legislation and irregular enforcement.

At present, by-laws exist in many Local Councils against grass burning, but they are 'neither effectively implemented nor relevant to the present problem of the fast degradation of the environment' (Korem 1985: 175). Rarely are there any applications to the Local Councils for burning rights, but when applications are made they are never turned down. One application was recently made by a Talensi chief for permission to have the annual rituals of burning around the sacred grove: 'It is a customary festivity celebrated annually by chiefs in out area and failure or negligence to observe this honourable practice means an insult to the powers of gods and may even result in a disaster in the village or clan concerned' (letter to Frafra Traditional Council 1975, in Korem 1985). The answer, of course, was 'permission granted'. Even on the higher District levels, the laws that exist are not implemented, and until the present 'there is no bush fire law effective for the whole country' (Korem 1985: 162).

Colonial era successes

According to Korem the period of the greatest success against fires coincided with the term of the agricultural officer Jones H. Hinds in the 1930's. He was convinced of the danger of fires to the Ghanaian ecology and maintained a systematic programme of rural education to combat it. His assistants were required to educate villagers and the chiefs were made responsible for all the bush fires in their areas. The chiefs therefore made sure their people obeyed the laws. However, the Northern Territory officials were of the opinion that the success of the venture was more due to the logic of the laws and the benefits accrued than it was to the strong arm of the chief. One officer felt that the people were behind the spirit of

the rules because of the abundance of dried grass that was saved as fodder for their animals (cf. Korem 1985: 160).

But these efforts proved unsuccessful as a whole and, as K.K. Cosmas tells us, 'died off sometime after 1950' (Korem 1985: 161). When the fervour of the colonial administration cooled things quickly got back to 'normal'. Still, if only for a brief period, due especially to the efforts of Hinds and the imposition of fines by the chiefs, there was some degree of success.

The problem persists

The efforts of Hinds were considerably undermined by the fear of wild animals. Nowadays there are no large predators left but the more-than-doubled population is still setting the fires with greater enthusiasm than ever. If we ask why the fires continue, anyone will tell you it is because they are useful!

Fires may be accidentally ignited by any number of causes including lightning or the practice of carrying of burning embers to the farm and from one household to another. But when people light fires it is to protect their houses, crops and trees of economic importance like shea-nuts and *'dawadawa'* (locust bean). It is for hunting, to obtain green sprouts for pasture, to get rid of crop residue and, most importantly, to clear new farms. The month of January is called *'Dzove'* in Ewe which means to burn the forest and in Twi *'Ohyefuo'* means to burn the farms. It is taboo for Westerners to talk about it, but fires are also set for the sheer joy of 'watching them burn'. One has only to witness the yearly fire-festival in Tamale to get into the mood. Given the diverse causes and the long history of failure, controlling the bush fire mania is a monumental task. Nevertheless it is one which must be addressed soon or Ghana will face a very desolate future. Citing the acute case of the Chereponi area, where the author, an anthropologist and a missionary, lived and worked with the people for more than seven years, learning their culture and their language fluently in the process, we will now try to see the 'problem' from the peoples' perspective.

Chereponi

The Chereponi Local Council is a geographical area and political sub-district located one hundred km north of Yendi, covering an area of about 1,100 sq. km and having one of the highest population densities in the

Northern Region.[1] The area suffers from the lowest rainfall in the Northern Region, an average of about 100 cm per year falling between May and October. The water table is continually dropping. Streams that held water throughout the dry season 25 years ago are now dry by November and wells and dams[2] in the area are usually dry by the end of January.

When approaching the environs of Chereponi in the dry season on the main Yendi road, it is as if one is entering a desert. One is greeted by laterite protrusions everywhere, 'ironpan' valley bottoms and mile-long hillsides of exposed shale, with hardly a desiccated tree in sight. These have been cut years ago for firewood, general utility, for harbouring witches and 'bush spirits' and, of course, those few remaining are scorched in the annual bush fires or are dying simply for lack of water.[3]

The denuded soil cannot hold moisture so the first violent rains wash away the little topsoil that survives the seven month baking by the sun. Every year the people complain of smaller yams, shorter sorghum stalks, smaller groundnuts, smaller yields and even smaller children. Many have changed over to millet as their staple rather than the traditional sorghum and yams. The women complain that they have to go further for water and firewood. The men complain that more of their domestic animals are dying in the dry season than in former times and there is less wood for construction. They all say that there is less rain, that the soil has become

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1. These statistics were estimated for 1980 taking into consideration the present growth rates recorded in the NORRIP Plan of Operations, published in January 1981. The author made the census of Chereponi and the area occupied by the Ghanaian Anufo in 1980.

Chereponi		**Anufo in Ghana**		**Anufo in Togo**	
Houses	231				
Men	544	Men	5747	S. Mango	8000
Women	679	Women	4938	Rural Areas	10,000
Children	1390	Children	17,109		
Total	2613	Total	27,794		

2. 60 wells were dug in the ten year period 1968–78 by Mr. Bob Thelen, an agriculturist working for the Evangelical Presbyterian Church of Ghana, with the cooperation of local farmers, of which about five now continue to yield water throughout the dry season. Three dams were dug by the government, though now only one contains water throughout the dry season.

3. From 1975 to 1985 the rains have been sub-standard. In 1983 they were 50% below standard. Moving through what seems to be a ten year cycle, since 1995 they have again been sub-standard.

less productive and there is more hunger now than there was in the past. Like the farmer whom Albin Korem interviewed (1985: 5), the Anufo[4] also say 'our soil is becoming too old'.

The chances are running out for the Anufo and other peoples of northern Ghana. The Sahara is gobbling up more than 70,000 sq. km of arable land per year. Ghana's high forests are less than one fourth of what they were in 1900 and are quickly becoming savannaised, while the tracts 'orchard bush' like those remembered around Chereponi have deteriorated to scrub, grasslands and desert.

Migration and demographic problems

Chereponi is nationally recognised as an ecological disaster zone (NORRIP Report 1982: 11.13) and it is fast becoming a chronic hunger area. In response to the land squeeze and to seek a better life elsewhere, in a pattern not inconsistent with that set by their forefathers[5], the Anufo or 'Chakosi' youth are leaving in droves. Many young men have migrated to the rich yam fields between Bimbilla and Salaga and to the 'trans-Oti' beyond Damongo and Kpasa. Those with a little education have joined the urban crush, while others have migrated to Togo and the Côte d'Ivoire as 'economic refugees'. But for those who remain, there is little choice but to continue their subsistence farming with ever-increasing intensity and ever diminishing returns.[6]

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4. The 'Anufo' (people of Ano or Grumania in the Côte d'Ivoire) as they call themselves, or 'Chakosi' (from '*cha*' [to cut] or [to wander] and '*kohi*' [to sell] in Mole-Dagbane, a reference to their war-like and mercantile reputation) a disparaging name their neighbours called them (cf. also Rattray 1932: 112-113), the Bi-Moba called them '*tumb*' which means grinding pestle (Norris and Heine 1982: 5; Kirby 1983: 60 ftn 38).

5. The Anufo migrated to the area from central Côte d'Ivoire in the 18th C. in order to conduct slave-raiding. They were not known for hard work. A British political officer reports, 'I like the Chakosis, but they are even too lazy to make decent sized farms' (GNA adm. 56/1/276 Feb. 1924). 'The inhabitants of Mango do not work, are only idle and perform their ceremonies; they are therefore constrained to raid continually the industrious and affluent pagan population' (Report by Gaston Thierry ANT FA 3/4077, 1897).

6. See also Norris and Heine (1982: 5) for figures on Anufo migrations. The 1960 Population Census of Ghana (1964: 117) recorded 560 Chakosi in Eastern Gonja and 860 in Krachi – both major yam producing areas. This is contrasted with the 9,240 in Eastern Dagomba, their home base. The Anufo contributed a substantial part of the post-war migratory pattern considering that more than one third of the able-bodied men went south to farm for extended periods. Shepherd (1978b: 96) speaks of the migration

The 'number one' problem

In recent years the Ghanaian government and various aid and development groups have tried to change things. Some of these groups have included: the U.S. Peace Corps, the British DFID and Action Aid, the Canadian CIDA, the UN Sudano-Sahelian Office, the Ghanaian Catholic Church with assistance from the German and Dutch Churches, and others. The most substantial efforts have been put into drilling boreholes, digging 'dugouts' and dams, and a variety of tree-planting schemes have been initiated. But what good is it to dig wells or even deepen them when the water table is receding so fast that they are dry within a few years, or to plant trees if they are burnt every year? Thus many observers reckon bush-burning to be the 'number one' problem (cf. NORRIP 1982). The vicious circle of burning, deforestation, erosion, desiccation and hunger is a familiar one. The standard solution of the development agencies has been tree planting. Agriculturalists more familiar with the local situation have also advised mulching the soil and the use of animal fertilisers instead of chemicals (Korem 1985). But all agree that the burning must stop.

The Anufo viewpoint

The average Anufo farmer normally responds to the advice of agriculturalists with a smile, a shrug of the shoulders and (as soon as the 'developer' has gone) a shake of the head with a wistful reflection that 'the European man[7] simply doesn't understand'. Korem (1985: 115-116) mentions that after trying to convince a group of farmers of the folly of their bush-burning ways, and seeing that he could not change their minds, 'left them to think about how foolishly they act against themselves by practising bush fires'. But I wonder if they rather didn't think him 'foolish'

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pattern becoming 'less seasonal and more semi-permanent, as opportunities in the southern urban economy expanded, and as land hunger and rural deprivation become more acute at home. Despite emigration, land hunger has not been substantially relieved, and soil erosion has worsened. Migrants' remittances have not been enough, nor of the kind required to be a substitute for their labour in farming'. He is speaking of the area around Bawku specifically, but certainly the Anufo territory which is just south of the Gambaga escarpment has comparable outmigration and poverty levels.

7. 'White man' (*nasalanie*) can refer to a European or the institutions imported from Europe including Ghanaian government along with Ghanaian government officials – police, border guards, judges, district and regional councils etc.

for getting so excited about what they have always been doing, indeed, what the ancestors insist that they should do.

Anufo problem-solving through shrines

To the Anufo and other groups of northern Ghana, the dire predictions of ecologists are de-contextualised musings which never reach the status of 'real problems' unless they find their way into human-spirit nexus. Anufo problems are formulated holistically, not just technically, and all important problems have a religious dimension; all involve relations between the world that is seen and the one that is unseen.

All Anufo problems can be categorised and solved on three levels using shrines – the individual level, household level and territorial level. Each level is represented by its own set of shrines and spiritual agents which claim responsibility for the problems and their solutions. The personal shrines such as the spirit-guardian (*nyeme*) and the various 'medicine' shrines (*ayili*), whose custodians are private individuals, deal with individual problems. The kin-oriented shrines or 'house' shrines (*awulu*) deal with those matters affecting the good of the entire kin-group or extended household. And the territorial shrines (*mie*) relate to the needs and problems of all the people within a given territorial area. If bush fires were to be considered a problem, they would come under the territorial domain. But the people do not regard the fires as a problem – they are rather part of a solution.

Although ritual problem-solving categories are distinct, they are not mutually exclusive. Traditional problem-solving involves a large number of possible interpretations and solutions which can involve all the levels simultaneously, and it takes into account a large number of variables. Because the 'real problems', from a scientific perspective, of desiccation and soil impoverishment are not the same everywhere or in every instance – indeed some places are always affected more severely than others, and conditions vary greatly from one growing season to the next – the misfortunes they cause, at different times, at different places and under different circumstances, may be linked to any of the levels of problem interpretation and management. To the people this is not one problem but many. On the territorial level an ecological problem or disaster could be interpreted as resulting from the Earth shrine's anger due to a disruption of ecological harmony through natural perversions such as having sex in the bush, a murder, an on-going feud between kin-groups, or an unresolved 'tribal conflict'. On the kin-group level a problem affecting only them may be linked to quarrels in the compound, an unattended oath, or

some other household infraction or broken taboo evoking the wrath of the ancestors. On the individual level, an individual's problem may be interpreted as due to someone's pervasive misuse of a rain shrine or other 'medicine' shrines, or to a household elder's destiny or spirit-guardian shrine. At each of the levels finding a solution always involves divination and sacrifice at the shrines appropriate to the levels concerned.

The Anufo generally try to fit the practical advice and scientific solutions of 'developers' into their own traditional problem-solving matrix. They do not object to development experts offering advice or help. In fact villagers openly vie for such aid. Chemical fertilisers and tractors head the list of favourites. But 'Nasalanie's (the European's; from *'Nazara'* (Arabic) or 'followers of the Nazarine', meaning Jesus) wonderful things' have not taken the place of the ways handed down by the ancestors.[8] The people's main responsibility, as they see it, is to uphold their traditions, to follow the ways set down by their ancestors and to preserve a harmonious balance between the seen and unseen worlds. The new alternatives offered by the West are chosen selectively according to 'how well it works' and how easily it fits in with their traditional world-view. Both the old and the new are subject to these pragmatic criteria - though what is judged as 'practical' or 'successful' by Western standards may not be judged so by theirs.[9]

In order to understand the Anufo standards better - especially those practical attitudes toward farming, trees, nature and the environment - we will consider the distinctions they make between 'house' (*awulu*) the epitome of society, order and harmony, and 'bush' (*bolo*)[10], which conjures up notions of chaos, disorder, and disharmony. From these conceptualisations we can make more sense out of what would appear to be a quite rapacious attitude toward land and property.

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8. 'Ancestors' is a term that epitomises a traditional way of life - everything that has been established as societal.

9. The West applies an individual criterion of 'success' or 'practicality'. An action is judged as 'saving time' if it frees the individual to do something else or produce the most with a minimum of effort from an individual. Africans, however, apply a criterion that fosters communal values and relations as ends in themselves, without producing anything but 'good relations'. But in a stressful ecozone such a well-maintained web of relationships acts as a buffer against life's vicissitudes and, in the long run, is perhaps a better guarantee of 'success' than 'money in the bank' (especially if the money is constantly devalued).

10. The 'wild' bolo can refer to uninhabited, uncultivated tracts of land, to the area outside the village precincts, or to faraway places such as Asante or Accra, i.e. any place that is foreign or unknown.

House versus *bush*

'House' as a concept is the elemental unit, the building block and cornerstone of the Anufo social structure and society. It can refer to a kin-group or a lineage - a group of people living together, sharing common resources and claiming to be descended from a common ancestor. It can also refer to the actual physical structures or compounds where this group of people lives, consisting of a series of mud and thatch huts surrounded by a wall. It is the body politic, a corporate economic unit and the centre of ritual action.

'House' is related to 'bush' environmentally and socially. 'House' has always been at the opposite pole, antipathetic to 'bush'. The household members have had to carve farm land from the 'wild', to drive its forces back and they continue to employ every available means to carry on the war against it. Here fire is especially useful. It thins out the 'bush', makes it 'clean' like a compound, squeezes it for meat, honey and chases away the 'wild things'.[11] Just as compounds are fortified with walls against 'things of the bush', villages have a 'fire belt' or 'invader belt' denuded of trees for miles around them. From time immemorial, fire has been the wall separating culture from anti-culture, keeping at bay the 'wild' which has been thought of as inexhaustible, unknown, evil and dangerous. Fire has been humankind's primary ally in the never-ending task of domesticating the 'wild'. Indeed the Dagaaba[12] of northern Ghana say that 'if we do not burn the bush the spirits will do it' for 'the ancestors do not like to walk in the bush'. The experience of the 'wild' and its control through fire has been institutionalised in the people's customs, practices and physical and human geography.

The 'wild' as a source of power

The 'wild' is not just a powerful enemy; it is also a rich resource, a provider of medicines, knowledge and raw, unrefined power. The 'wild' has been recognised as potentially helpful and useful but because of its natural unsocialised context, it can only be digested in measured doses. This chaotic and threatening quality of the 'wild' operates at the core of many

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11. Goudsblom (1986:14-15) theorises that competence in handling fire developed especially as a result of its utility as a weapon with which to dominate their world.
12. Archbishop Peter Dery of Tamale pers.comm.

'medicines' to counteract the disharmony of illness and danger. Most Anufo 'medicines' are not effective clinically so much as they are socially and psychologically. Roots from a crocodile's hole, bark from a tree which grows at the crossroads in the 'bush', or the branches of a thorny shrub called *nabuli* which grows in thickets so dense that in the past it offered asylum from the most feared denizens of the wild – the Cape buffalo and the lion – are used to treat various illnesses and social problems to which they are metaphorically related. Their power does not derive from any chemical reaction but from their social and environmental contexts. They work not by killing microbes but by association. Thus, for example, there are no domesticated plants that are used for medicine among the Anufo[13] for domestication in itself would denote a decrease in their source of power – their primordial context.

Knowledge, skill and technical ability are all derived from the 'wild'. It is believed that humans were taught these secrets by the spirits of the 'wild', the 'bush fairies' (J.R. Goody 1972). It is fabled, for example, that hunters originally stole fire from the 'bush fairies'. Similarly, the manufacture of iron is specialised knowledge that has been stolen from the 'bush spirits'.

Maintaining distinct categories

Categories must remain distinct and well ordered to retain their power and usefulness (Douglas 1978). The Anufo and many other peoples of northern Ghana say, 'if you plant a tree you will die'. This is not a naïve statement from an illiterate peasant or just another 'superstitious belief' which can be countered by pointing to the many examples of people who have planted them and lived. Here the exceptions do not falsify the rule. This sort of admonition must be regarded as good advice that 'if you go about mixing up our categories you will destroy our society'. The 'wild' must not be confused with or mingled with the 'house'. Society's energy must be

13. There are a number of domesticated plants, however, which because of the unusual circumstances associated with them, have special power, e.g. the twin millet pod which, when found in the natural state is preserved for fertility rites. Its efficacy rests precisely in its chaotic and unpredictable fecundity, however, not in its domesticity. It is the 'wild' within the domesticated realm. The only other exceptions are those common-knowledge medicines such as neem tree leaves for catarrh and malaria which are picked and processed freely by anyone. Indeed the process of medicine becoming common knowledge and its secrets and use becoming universally accessible can be viewed as a both a cause and result of the domestication of the 'wild'.

regimented to put order into chaos, to tame the 'wild'; not to let chaos creep into order. In Africa, the 'bush' tree is both a symbol of chaos and actually a part of it, and must not be brought within the realm of the 'house'. Similar comments can be made about semi-domesticated and wild animals. The people say, 'if you become too friendly with a dog, it will lick your face!' The West is trying to preserve the elephants while Africans see them as a nuisance or food. The A.S.P.C.A. and the Audubon Society, as cultural institutions, demonstrate clearly in the Western world how much territory the domestic has claimed from the 'wild'. But even the West has its 'bush'. Take, for example, its fascination with the weird, with creatures from 'outer space', or our dark primeval origins, or the unseen world as a whole.

'Useful' trees

In the Anufo case, as with other peoples of northern Ghana, trees are both collectively and individually the enemies of society. There are, however, three types of trees which are not a threat to the Anufo social order or are in some way domesticated. The first type is not native to the area and can be planted in front of the compound for fruit, shade, or firewood. These usually include neem, guava, mango and various citrus trees. The second type of tree is that which springs forth of itself, against great odds because of the constant sweeping and traffic around the compounds. These are usually baobabs or kapoks and are often thought to be reincarnated ancestors. The third are the trees of the 'sacred grove', the locus of the Earth deity (*mie amue*). These trees are usually 'bush' trees which have been sequestered in their own little virgin forest of 20–50 meters in diameter located within or just beyond the village precincts. It is not cultivated, burnt, scavenged, hunted or used in any way[14], and only the elders may enter the 'sacred grove' for ritual purposes on occasions that mark the major seasons, e.g. planting, harvesting and hunting. It is around this grove that the first burning of the dry season takes place to inaugurate the annual bush-burning 'offensive'.

The presence of this fertile and verdant 'sacred grove' in the midst of secular, domesticated space testifies to a certain primacy that is given to the 'wild'. For all domesticated land was once 'bush' and, in the past at least,

14. Korem gives convincing evidence of the high percentage of organic matter in such groves (13.1% as opposed to 1.5% elsewhere) which he contents is a result of the continually accumulating ground litter (1985: Appendix 3:193–196).

if not for the socialising restraints that maintain a constant and careful balance, the 'wild' would easily over-run the domestic. Thus the 'sacred grove' is safely mixed space. Here, as if at a crossroads or village market, human society bargains with nature while the forces of order and chaos stand at uneasy truce.

These observations yield two essential insights regarding the traditional Anufo mentality toward trees which have serious implications for bush-burning and ecological management: (1) Conservation of 'bush' trees, except under special conditions such as the 'sacred grove', is not only useless, it is dangerous to society. (2) To engage in planting trees especially 'bush trees' is not only unreasonable; it amounts to an anti-social crime and it is presumptuous for it interferes with nature, i.e. 'God's work' (*Nyeme de juma*). An Anufo would certainly have great difficulty in planting a tree and saying, 'this is my grandfather come back'. This view of the 'other' world is so integral to their cultural identity, they are unaware of it. It is hidden from them. Yet it manifests itself quite overtly in their behaviour, social institutions, etiquette, and above all in their symbolism and metaphors, proverbs and folklore.

The war against trees

Wherever one goes in the North one sees what appears to be a complete disregard for the ecological value of trees. Otherwise majestic rows of mahogany at 'Education Ridge' in Tamale have grotesquely gnarled trunks from decades of having their bark scraped for medicine or casually whacked with cutlasses by passing students. Why the destruction, mutilation, and general disregard? 'I never thought about it' answered one person. A farmer simply said, 'Can we eat them?' (Korem 1985: 115).

The only reprieve in this attitudinal war against trees is the allowance of fruit-bearing trees. People are even receptive to planting these if they are easily obtainable and they do not involve much care. But a tree is no sooner planted, than a goat or cow eats it or someone breaks off a branch for a 'chewing stick'. Even if it can survive these assaults, only the hardiest will survive the first two dry seasons. It is unthinkable to waste water on a tree when one does not have enough water to drink or to give to the livestock.

In the entire Anufo territory in Ghana I knew of only one orchard of mangoes. It was only about 20 trees, planted by a Yoruba trader who has long since returned to his native Nigeria, alongside a stream by one of the main village routes to Chereponi. But because it was the only thing resembling a forest in the surrounding treeless plain, there were regular reports of attacks by the bad 'bush spirits' thought to be lurking there.

These attacks usually involved elderly men who had become thoroughly drunk at Chereponi market and were walking home in the night. Finally, after one such assault, diviners were consulted and it was decided (in 1979) to cut the trees down in order to force the spirits to flee.

Although the people can appreciate the value of a shady orchard and may even be encouraged to plant one or the other tree around their compounds, once it is grown it may be perceived as 'bush' and be destroyed. A few years after his departure from Ghana Mr. Hurtado's mango (36 ha) and kapok (48 ha) orchards on the outskirts of Tamale were cut down for firewood and mutilated by fires. A new phase in the rejuvenation of Chereponi's ecology began in May 1986 when the Chereponi youth were forcibly mobilised to plant a five acre lot of firewood. Today, after more than a decade of development aid and tree-planting schemes, the area is bleaker than ever before. There is something more basic here that is being overlooked.

Anufo society is like a well-tuned locomotive rumbling head-on against the 'wild' and everything that is associated with it. Although there is no more actual 'bush' left, the train steams on, gathering greater momentum, because there is even less to impede it.

The political economy of depredation

The Ghanaian Anufo are essentially Para-Gurma peoples (Kombas, Bi-Mobas, and Konkombas) who have become 'Anufo-ised' over the years by being incorporated into the lowest level of the Anufo tripartite 'estate' system (cf. E.N. Goody 1973 and Kirby 1986). Their social structures and attitudes toward nature and ecology are therefore influenced both by their forefathers and by the Anufo conquerors from Sansanne Mango[15] in present day northern Togo. When these Anufo raiders arrived in the Chereponi area they either killed the original Earth priests or usurped their roles[16] by appointing local head men whose task it was to collect the yearly

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15. For the social, political and religious systems of the Konkombas see Tait (1958 and 1961).

16. The kind of tactics used during this period are aptly demonstrated in a ritual renewal of an Earth shrine which has frozen in time an archaic drama. Every three years in the Anufo village of Nyangbande about eight miles from Chereponi, the elders 'invite' the Earth priest from the neighbouring Komba village of Nanchem to come and invoke the ancestors and the Earth gods for rain and prosperity. During the ritual the Komba Earth priest is stripped naked except for a loincloth, and a rope is tied around his waist as the Anufo elders and youths go through the mock drama of dragging him

tribute. Just as the sacral dimension of the land was subordinated to the needs of secular predators, the ritual/ecological became subordinate to the utilitarian. An Anufo informant once summed it up for me in this way, 'We were the White man before the White man came'. The Anufo were accustomed to using force to get results even in the sacral world, as the lyrics of a Fombolo clan hunter song indicate: 'Our god is our gun'.

Once the Anufo of Sansanne Mango were prevented from going out on their annual dry-season razzias by the Germans 1894, many of them settled in their outlying 'farming' communities around Chereponi where they had been collecting tribute (Kirby 1986: 25). Their rapacious attitude toward people[17] then extended to the earth itself. Above and beyond the use of fire occasioned by a healthy fear of the bush, which we find among the autochthonous peoples of northern Ghana, it was this spirit of organised depredation of the bush by invaders that has led to the present ecological nightmare in Anufoland. It remains to be further researched but we may expect to find a similar depredation of land and people among the other centralised states of northern Ghana, the Gonja, Dagomba, Mamprusi, Wala and Nanumba, who together in pre-colonial times looked upon all of northern Ghana as a resource pool and in colonial times, under the terms of 'indirect rule', were given the political and ecological management of the entire North.

Changing social habits

The problematic cycle of burning, deforestation, erosion and desiccation is launched and perpetuated by society. People learn the value of bush-burning along with the danger of trees and how to deal with these in everyday life from infancy onward. Social habits are developed which help

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about from shrine to shrine beating him and forcing him to make the necessary libations and sacrifices. Amid genuine hilarity and not a little self-consciousness the Anufo youths are, encouraged to shout out abuses like: 'When you finish, if it does not rain immediately you will join your ancestors'. But by contrast to the original event, the present re-enactment is controlled by the Kombas whose Earth priest now makes real demands upon his former Anufo masters: 'Take me here to this place...All be silent...put the rope around me like this...Tie it tightly...(and finally) put all the slaughtered animals in the baskets and gather all the sorghum beer and send everything to our village'.

17. The Ghanaian Anufo (or 'Nalori Anufo' as they call themselves) traditionally sent tribute to Sansanne Mango. Gradually the Sansanne Mango households, which acted as independent raiding units, installed 'headmen' (*miekpie*) in their tributary villages, who were usually their 'household slaves' (*mburuwam*). Thus Sansanne Mango Anufo to this day refer to the 'Nalori' Anufo as their slaves.

to define identity and unconsciously affect behaviour. As Ghanaian school children walk along a bush-path they use their cutlasses to randomly whack at trees in the same way a boy in Europe might kick a stone. The inordinate burning of the 'bush', the cutting of trees and refusal to plant new ones, the casual attitudes toward more ecology-wise farming methods such as mulching and using animal fertilisers, the lack of care for young plants etc., not penning the goats or other animals, are all interconnected social habits that are learned and promptly become part of the unconscious social identity.

Alvin Korem's (1985: 24, 155, 163) attempts and those of others to change destructive social habits through the 'Information Service', by using logical arguments and workshops are only partial solutions. The Anufo do not view bush-burning as a harmful habit. Although some are aware of some of the harmful effects which we know to be caused by the burning, they may or may not see the association. Part of the reason for this and other problems is the rapid speed with which these changes have taken place. They say, 'our fathers have always been burning but those problems have come only recently'. It is analogous to the way in which, up until now, having a large family has always been valued as part of the solution to economic problems rather than a part of the problem itself.[18]

If you tell an Anufo farmer that he is destroying his environment by burning, he will listen respectfully. Some may even come to believe it but they may not be able to stop. To break with a social institution is not usually a matter of individual choice. Innovators must have a certain level of support or they are seen as destroyers, as 'witches' whose fate is death or expulsion.

Bush-burning is an unquestioned tenet impervious to Western logic. It cannot be changed by logic any more than one can convince a smoker to quit by telling him that it may be harmful to his health. Changes cannot be brought about simply by 'explaining the facts' because the facts themselves are filtered through cultural lenses. They cannot be changed by pilot projects or showcase farms alone, precisely because these attempt to demonstrate Western cultural institutions out of context and thus ignore the interpretative gap.[19] They cannot be changed by the self-help schemes

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18. Usehold rather than freehold inheritance structures mean that there is no ecological restriction on numbers, rather labour is the key since 'the value of property or capital depends on the number of people who are available to exploit it' (Pitt 1976: 199). However, in Anufo land there is almost no uncultivated land left.

19. I once overheard two farmers discussing the size of the bullocks at the German Volunteer Service Agricultural Station at Gushiegu. One explained to the other that 'the white man's bullocks are so big because he gives them injections'. The often repeated

upon which most development projects are based, because these presume the very perspective the innovator has come to bring. The social habit of bush-burning is reinforced by socialising institutions and it is legitimated through rituals rather than logic, e.g., the sacrifices at the Earth shrine or consultation with the ancestors.

Burning can, to some extent, be minimised by controlling the learning process or suppressing the inappropriate habits from the outside - through governmental laws and agencies of development etc. Strict surveillance and the imposition of fines proved useful in the 1930s, and such action could be tried again but it is costly, unwieldy and its association with the colonial era[20] would make it unpopular. Furthermore, the negative reinforcement of stricter controls only lasts for a short time unless accompanied by a new perspective at the local level. Here is the rub. Lasting changes must come from the heart of society. They must involve a re-socialisation process. In the case of northern Ghana this re-socialisation must aim at a greater domestication of fire and a nurturing attitude toward the 'bush'.

Short term versus long term benefits

One of the problems is getting the people to choose long-term benefits over short-term benefits. The people say, 'if you plant a tree you will die before you see the fruit'. Others simply say: 'if you plant a tree you will die'. Either way the short-term benefits seem immeasurably better than the long-term. One may also distinguish between the benefits that accrue to the individual versus those that will accrue to the community as a whole. Whereas the entire group can plausibly benefit in the long run from non-burning policies the individual or household groups stand to benefit more in the short run from the burning. This can be confirmed by asking Anufo men why they burn. Here are a sampling of their answers: 'I burn because it clears the bush'. 'I get meat for my family!' 'I am free to walk in the bush'. 'My wife can easily go for firewood'. One made the observation that

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advice to 'feed your animals' simply cannot be taken seriously by them because this is a stage in the process of the 'domestication of the wild' which they have not yet reached.

20. The successful but unpopular non-burning laws of the 1930s in the Northern Territories imprisoned anyone caught burning and imposed fines of one Pound Sterling on every adult in any village whose land had been burnt anonymously (pers. Comm. Fr Tom Tryers M.Afr., who opened the Catholic Mission in Tamale in 1949).

'the ashes fertilise the soil' (which would be true if they weren't washed away with the first rains). Others stress the new sprouts for pasturage and some point out that fire makes the shea-nut and locust-bean trees more fruitful. But by these answers we should not be misled into thinking that we now understand why they burn. Though these may or may not actually be true, the point is that they would burn anyway. Such responses usually show greater adaptation to the interviewer than to the ecology. They are merely 'reasonable' parries given to troublesome experts to fend off the 'reasonableness' of their unacceptable proposals to stop burning.

In the end, distinguishing between the long term and short term benefits, in the minds of the Anufo, only affect their decisions about when to burn or what to burn now and what to leave for later. They do not affect the notion of burning itself. Even if it were economically non-viable to burn the 'bush' (as it is now quickly becoming around the Chereponi area) it still would be (and, in fact, is) burnt; and vice-versa, if it were made worth their while as individuals not to burn the bush, it would still somehow 'get burnt'.

Hunting and the economics of status

To stop burning must also mean to stop hunting in the traditional way. To the Anufo, who can no longer follow the warlike ways of their ancestors, hunting is not so much an economical venture as it is a source of prestige and self identity.[21] The tail of a rabbit, the horns of an antelope or skull of a warthog hung as trophies at the compound entrances, are an end in themselves. The old men praise the hunter who struck the death blow calling him a 'chief'[22] and young girls vie for his affections. Therefore logical arguments about the high ecological cost of this way of hunting do not get much sympathy.

But even if a satisfactory substitute for the prestigious hunt could be devised and if the disruption of other social relations dependent on bush-burning could be minimised, we could not be assured of the success of any 'no burning' policy without careful supervision and strong controls.

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21. The Anufo evidence supports theories (Dalton 1966) that interpret prestige and status as the source of all economic behaviour. The word 'hunter' among the centralised peoples of the North is variously translated: 'raider', 'equestrian', 'ruler'. The father of the Mole-Dagbon states was dubbed 'the Red Hunter'.

22. Hunting is the 'work' of the elite – the nobility (*donzom*), the class of hunters or chiefs (cf. also Tauxier 1921: 98 ftn 3; Delafosse 1955: 470; Cisse 1964).

Alongside wife-theft and cattle-theft, burning another man's hunting land ranks highest among the cases of civil dispute brought before chiefs. How much greater would be the temptation to poach another man's 'bush', if he were to leave it unburned the whole dry season. And even the greatest care cannot prevent the occasional accidental fire, which once it gets started, may continue for days scorching thousands of hectares.

Creatively dealing with the problem: a multi-faceted approach

Korem (1985) advises a threefold programme of schooling, improved agricultural practices and a nation-wide enforcement of laws. But besides the visible benefits which appeal to individual pragmatism, there are many not so visible benefits and considerations which are deeply rooted in the Anufo social institutions. Indeed, the keys to understanding the visible, pragmatic aspects of burning are often the invisible, spiritual and social aspects. As we have seen, some of these include the prestige gained in the hunt, the need for the security of a buffer zone against the wild, and the need to 'respect' oneself, one's ancestors and one's traditions. A co-ordinated campaign will not be of much help unless the unseen dimensions of the problem are also identified and dealt with. Thus a multi-faceted programme involving controls and re-socialisation is needed that addresses both the visible and invisible aspects of the problem.

Missing the point

All serious misfortune is ultimately related to mystical intervention and, despite modern innovations, the Anufo continue to look to their ancestors and spirits for help with their problems. They regularly consult diviners to 'see' if any of the potential invisible problem sources (e.g., an irate ancestor or disgruntled spirit) are present. The consultations tend to confirm communal beliefs as they exercise the traditional solutions.

Perhaps the main reason why government schemes and Western development efforts to control bush-burning have failed is that these efforts approach the problem as if it were caused by individuals acting illogically. But these are essentially social problems at the level of the kin-group and the territorial group, involving the visible and invisible forces of the 'house' and 'bush'. Attempts that are made to convince individuals to prevent fires using Western logic or to control them using Western

technology miss almost all of the various 'points' of a manifold problem. The 'problem' is not a 'problem' to the people, nor is its solution in the hands of individuals, nor is their present response illogical from their perspective, nor is the solution a matter of learning a few new techniques. It is rather a matter of re-socialising institutions 'run wild'.

The domestication of fire as a 'civilising' process'

Fire has greatly enhanced the extent of man's domestication of the wild but now that there is no 'wild' left the institutions surrounding the use of fire must be re-socialised. Every society has its own built-in means of re-socialising errant institutions.

Besides greatly enhancing human life chances, the use of fire 'has also imposed compelling restraints' says Goudsblom (1986:9). He has emphasised that as primitive human groups came to depend more and more on the advantages of its warmth, its usefulness in clearing the bush, for cooking food, and its advantages in warfare and protection against wild animals etc. they also became 'increasingly dependent upon the very conditions which enabled them to use fire' (Goudsblom 1986: 18). Therefore social arrangements for securing fire, for handling it, for safety, to keep it burning, and, presumably, for responsible group actions to deal with it, have gradually arisen and have been institutionalised in societies.

In order to partake of its benefits, groups have had to evolve skills and mentalities needed for a continued possession of fire. Thus Goudsblom insists that the domestication of fire has presupposed mutually reinforcing traits, mental and technical, which are embedded in a social cultural context. These contextualised cultural institutions were the means of passing down knowledge, skills and socially induced human self-controls from one generation to another. Its development over the course of time may be regarded, as he calls it, 'a civilising process' (Goudsblom 1986: 17).

With these reflections in mind 'development' would mean establishing the conditions for directing the 'civilising process' – in this case bringing about the further domestication of fire leading to a greater degree of social responsibility for the ecology. This 'civilising' must occur within the traditional cultural patterns of the people including their patterns of culture transmission. Among African peoples the cultural institutions are also the socialising institutions – there are no traditional schools outside of the 'school of life'. Some of the Anufo institutions which need re-socialisation with regard to the use of fire might include the following: (1) Hunting: the fact that there are few animals left is an important factor guiding the process. (2) Protection from the visible and invisible forces of

the 'bush': the fact that there are fewer such forces and less 'bush' is a guiding factor. (3) Agriculture, especially the ways of clearing the 'bush' and eliminating crop residue: besides the fire 'control' issue, the ways flora and fauna are categorised as 'useful' or 'useless' is an important factor here given the bio-medical and scientific understanding of usefulness. (4) Ritual space: the integrity of the sacred groves and the changing demands for separation from and integration into the realm of the domestic. (5) Domestic space: the increased realm of the domestic must involve a greater integration of the 'wild' (e.g. new types of crops raised on local compound plots that are manured, greater domestication in animal 'husbandry' etc.) These are the institutions to be re-socialised at the grass-roots level through the local institutions themselves.

The use of taboos

Before development work existed people developed by redirecting social behaviour through taboos. Today African societies often develop in spite of Western agencies rather than in conjunction with them. People have no problem shuttling between the visible and invisible worlds, between Western and African worlds, whereas agencies of Western-styled development do. Myths and taboos continue to orient and direct the masses alongside logical persuasion and modern laws. These myths and prohibitions are not the last glimmerings of obsolete traditional culture but they are powerful vectors for apprehending the present (cf. also Pitt 1976: 86). Since traditional prohibitions are both expressive and instrumental (cf. Kirby 1987), they tend to confirm social identity, they help to ensure responsible communal behaviour by drawing attention to commonly held values, and at times they actually effect the desired changes by evoking the most hard-hitting sanctions. The most appealing Western 'civilised' sanction is reason. Africans often find it ludicrous how Europeans revert to logic to get their children to do things. In Africa appeal is made to the ancestors. The almost universal taboo against carrying lighted firebrands (but rather carrying glowing embers) through a compound, for example, is not explained in terms of the fact that it obviously reduces the possibility of the thatched roofs catching fire, but rather because 'the ancestors forbid it'.

Among the Anufo, tabooed patterns of behaviour are called *cili* (lit. at the back). They are man-made, usually conservative rules sanctioned by the ancestors. They may arise from particular interest groups but if they are to succeed, they must not stray far from the central themes of society as a whole. New taboos are being formed all the time. Although they claim to

support society's ideals they can also innovate by helping the members to adjust to a new identity, as has been demonstrated in a recently coined taboo against eating frog meat (Kirby 1987). Shifting against the backdrop of the changing social concerns, and representing as they do so both the fragmented ethos of a bygone era and a contemporary drama in the course of being re-mythologised, taboos use the culture-laden but broken symbols of the old to reform the boundaries of a new identity and world-view which then give new meaning to practical action.

Nurturing the conditions for change

Over a period of generations traditional systems do change in relation to environmental, internal and external stress. But they often slowly drift, rather than develop in any conscious, organised fashion. With respect to bush-burning it is crucial to give this 'drift' some direction by making some new taboos.

In the end it is not what the government says or even what it sanctions that will bring about real change. Bush-burning will continue until the ancestors themselves sanction the laws against burning. Anthropological analysis can help us to re-frame the problem in terms of these deeper invisible cultural factors but the best initiatives come from the people themselves. Political and religious figures on the national scene should work closely with traditional rulers and 'Earth' shrine custodians, for this is the work of the traditional political and ritual heads.

Ecological statements and controls must begin to take seriously the 'natural' reality of the people living in villages. It is a reality that includes both the visible and invisible worlds. It is difficult for Western-styled governments to enlist the aid of the ancestors – though not impossible. Nkrumah developed his own *osagefo* or 'savior' cult through the oral poetics of State Okyeame, Okuffo Boafo. But better than doing it themselves, they can make way for those in the traditional sphere to do so. As an example of such a creative local initiative toward the problem of bush-burning, in response to the crisis of 1983-4, the now deceased paramount chief of Gonja, J.A. Braimah, in addition to collecting fines from offenders, began to organise the 'Earth' priests to ban bush-burning. Unfortunately he died before his 'experiment' got very far. Nevertheless, this was a big step in the right direction and the importance of such action should be recognised by the national government. One avenue of approach that traditional religious leaders might use to 'ban' burning is that of 'oath-making' and we will conclude with some observations on this theme.

Oaths and ancestral sanctions

Among the Anufo and other tradition-bound Northern peoples, the highest court is not in the 'visible' world at Tamale or Accra, but it at the invisible 'court of the ancestors' (*samando*). It is reserved for only the most serious cases. One does not swear an oath to the ancestors lightly, for to bring a case there means to forfeit one's own life in order to be vindicated. Calling upon the ancestors to judge a case means that everyone involved must first die before they can be judged in the world of the dead. There can be no doubt that such beliefs still hold a very firm grip on the inhabitants of northern Ghana. I have witnessed members of a family dying one after another of no apparent medical cause in connection with such oaths.

Oath-making and other forms of ancestral sanction are at the heart of taboo-making. If 'Earth' priests were to swear an oath at the 'Earth' shrines against bush-burning offenders, the 'invisible' side of the problem would be instantly checked leaving only the 'visible' side of the problem to be dealt with. There would be those who would flout even the authority of the ancestors but they are the exceptions and the government laws could adequately deal with them. The 'visible' side is dealt with by the normal means that are currently being used without any success: education campaigns, training, demonstration farms etc.

Bush-burning is but one of many serious socio-ecological problems affecting Africa today for which Western scientific epistemology and technology have been applied and found wanting. Traditional sanctions, especially those involving the invisible world, are still the most effective means of handling critical problems among predominantly rural African populations. In today's popular culture Ghanaians say: 'Black-man medicine for Black-man Palaver'. African leaders should give their own solutions a try.

Development postscript

Can one believe in the ancestors or the spirit world and still be 'developed'? Or is such a world-view so totally incompatible with scientific knowledge that it must be ruthlessly swept aside to make room for modern life? This is an important question not just for Africans, but for our 'post-modern' era. For a 'free people' we in the West are surprisingly constrained by our own ethnocentric ideas and intimidated by other world-views. 'Globalisation', 'development' and 'democratisation' are becoming slogans

for a new culture-crunching 'liberal' crusade. Globalisation conceals a hidden agenda that forces everyone to take on a global (read 'Western') world-view, to buy into the same global materialistic culture that controls the world economy, though with fewer shares in it. 'Development' means having to buy copyrighted knowledge from the West[23] at inflated prices. And 'democratisation' means having to pay the international election observers (in the recent 1997 Ghanaian elections for example) more in their fees than what it took secretly to bribe the local constituency. The last sardonic laugh will be on everyone.

In spite of this crusade, rural peoples in the 'under-developed' parts of the world, in Africa, Asia and South America, continue to employ interpretations of reality that are creatively expansive and that do not limit 'reality' to only that which is measurable or sensed. A balanced global ecology needs to keep diverse cultures alive as much as it does other endangered species. Ghanaian traditional perspectives have as much to offer the Western world as they do for their own development, for example: the importance of the 'invisible' world for improving conditions in the 'visible' one. Ghanaians value the knowledge other cultures have to offer and are actively blending them. Theirs is a different model worthy to be imitated – development as 'dialogue'.

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23. Despite the temptation to describe them as closed systems, the traditional systems of problem detection and solution do in fact, introduce new means for legitimising and incorporating changes. Diviners give the problems a context and a familiar structure making it possible for their clients to deal with them. But when no solution can be found for a chronic problem, it is taken to be the person's fate (*Nyeme nkaali*) and in an attempt to change the 'fate', previously deemed 'anti-social' behaviour could be legitimised (Kirby 1986).

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8
'Sow with Skill, Reap with Joy' Some Aspects of Institutional Change at a Farmer Training Institute in Ghana

Kevin Waldie

Introduction

Wenchi Farm Institute as an object for development

In July 1994 I began work on a project aimed to improve the quality of agricultural training and education to people in Wenchi District of the Brong Ahafo Region in Ghana. The project, funded by the British Overseas Development Administration, (ODA now DFID) was based at Wenchi Farm Institute (WFI), one of three surviving farmer training Institutes run by the then Training and Manpower Division of the Ministry of Food and Agriculture. Originally the Project had been conceived in terms of strengthening technology development and dissemination at the Institute, but during the early stages of implementation it became readily apparent that the substantive developmental issues had far more to do with the design and management of organisations than that of adaptive trial sites.[1]

The following extract taken from my personal diary illustrates something of the themes of institutional change that were to come into increasing focus during subsequent years.

> 'My first day in my new job. In the office my colleagues huddled around a table examining the proposed new emblem for Wenchi Farm Institute. It was an heraldic shield depicting a variety of agricultural motifs and included a motto. The emblem is to front a publicity flyer, to be paid for by the project, in an effort to increase the numbers of Farm Institute students which have dwindled dramatically in recent years.

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1. The Project was called the Wenchi Farming Systems Development and Training Project. Its name indicates the original focus on adaptive research and the development of alternative farming systems as a means of bringing benefits to people 'within a 50 kilometre radius of WFI'.

I was asked what I thought of the new design. I commented upon the presence of a fish, which surprised me since the Institute does not teach aquaculture. It was, however, the motto which caught my attention. It ran 'Sow in tears, reap with joy'. Sow in tears? I suggested that for an agricultural training institute the implication that one learnt through suffering was inappropriate. I argued for something more positive and suggested 'sowing with skill' would be a more fitting idea. The idea was, at first, greeted with polite but tempered interest. After all, the motto had, as far as anyone knew, been with the Institute since its inception in the early 1960's (albeit long forgotten and only recently discovered by a close examination of some dusty old photographs found in the library). It was also pointed out to me that to change the motto would require the agreement of the Director in Accra, himself a former Headmaster at Wenchi.

The Director was contacted over the phone. He approved the new motto but insisted that the fish remained noting it was fitting for the Ministry of Food and Agriculture to highlight, in this way, the wide range of production activities it seeks to support nationally.'

(July 1994, personal line diary)

During the months that followed the Project became increasingly drawn into examining the existing and potential strengths and weaknesses of WFI as a provider of agricultural education and, in particular, its potential relationships with other agencies, both government and NGO, that are providing agricultural education, training and information services to rural communities. This paper highlights a number of the themes that emerged from this iterative process of investigation and investment which appear to be of more general significance in current debates relating to the changing role of institutions in rural development. I shall begin with a description of WFI as it was in 1994, followed by an exploration of some of the factors that had led to its decline and malaise and, I suggest, loss of its own sense of purpose.

Wenchi Farm Institute

WFI provides a one year certificate course in agriculture, drawing its intake primarily from junior and senior secondary schools throughout the country. Formerly the certificate could provide the graduates with an entry into government service at the level of 'technical assistant' but in recent years, in line with a commitment to the World Bank structural adjustment policy, this recruitment no longer takes place. In 1994 staff spoke of the

Institute as now being a 'vocational training centre', although this change was nominal only as no alteration in the curriculum or teaching methods had taken place to reflect such a new emphasis.

In 1994 WFI had but 34 students attending the one year certificate course, a slight increase on the previous year. Eleven tutors, mostly trained to diploma level and a score of support staff were stationed at the Institute. The certificate course was based upon a syllabus most recently revised in 1981 which covered arable, horticulture, livestock and poultry production, as well as farm management, mechanisation and English. Teaching included both theory and practice sessions but didactic classroom instruction predominated. The tractor had long since been rendered unserviceable, and subsequently much of the 20 acres of Institute farm land, tired from successive plantings of maize, lay fallow. The dormitories, which were designed to accommodate 120 students, remained structurally sound but in a poor state of repair, as were the staff houses, classrooms and farm buildings. In many respects, therefore, WFI looked like so many other service institutions that litter the landscape of sub-Saharan Africa, built on the bright expectations at the dawn of Independence and gradually worn down by the starker 'economic realities' imposed by international funding agencies during the 1970s and 1980s.

WFI had been built during the early 1960s, a period when significant investment of development funds were being made into large rural infrastructure projects throughout Ghana.[2] The Institute was established by the Department of Training and Manpower of the Ministry of Agriculture with financial and technical assistance from USAID. It was one of a number of training institutions run by the Ministry at that time which included five further Farm Institutes, three Farm Mechanisation Schools and two Agricultural Training Centres (latter to become Agricultural Colleges).[3]

The Farm Institutes offered a one year 'post-primary' residential course to 'boys and girls who either want to farm on their own or will take up jobs with food production organisation' (Saah 1968:2). The course ran from

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2. Around Wenchi (the home of Busia, first Prime Minister of the Republic of Ghana) the same period brought the construction of a state farm, a livestock station, a large canning and food processing factory none of which continue to function.

3. The other Farm Institutes were at Asuansi, Central Region (1959), Damongo, Northern Region (1964) and Adidome, Volta Region (1965), Ejura and Navrongo. All the Farm Institutes had been established with the help of foreign aid, the Soviet Union funding Adidome, the Catholic Church and Canadian Aid supporting Damongo with the rest being funded by USAID. Ejura and Navrongo had originally been Farm Institutes but were later redefined as 'Mechanisation schools'.

January to December and included Crop Production, Animal Husbandry, Farm Shopwork, Farm Management and Farm Mechanisation as areas of study. The minimum qualification indicated was 'the ability to read and write in English'. The elementary school leaving certificate was 'recommended but not essential' (MOA 1965:45).

The objectives of the Farm Institutes, which have remained more or less the same to this day, are recorded as follows:

- to help increase general farm production through the training of boys and girls in modern methods of farming
- to train students in basic mechanisation skills
- to improve the general education and sense of responsibilities of the students through various extra curricula activities
- to develop and demonstrate improved agricultural techniques through adult farmer training programmes (MOA 1965:50).

During the 1960s demand for places appears to have exceeded availability by a long way. WFI, which originally had a capacity of 100 places, is reported to have received yearly about three hundred applications 'from boys and girls who intend to take up a career in farming' (Saah 1968:2; MOA 1981:1). At this time prospective students had to undergo an interview to assess their suitability. But with the shortfall in numbers, especially during the 1990s this practice stopped. Places on the certificate course were advertised in The Daily Graphic and The Ghanaian Times, both National Newspapers, every August and September, a process that still continues. However, from available records it is apparent that trainees were being drawn not only from Middle School but also from the government organisations and the various state-funded programmes that were running at the time.[4] Over time, the numbers of state sponsored students declined and by the 1990s, the smaller student intake was made up almost entirely of self or privately-funded students.

However, records indicate a marked fluctuation in student intake over the years, rather than a steady decline. And although the early 1990s represented a clear crisis in the Farm Institute, with the removal of 'mess' and other government subsidies, other troughs are not yet readily

4. Of the 252 students who attended WFI between 1963 and 1996 only 57 were registered as private students. The remainder were drawn from the State Farm Corporation (64), Young Farmers League (89) Union of Ghanaian Farmers (24), Workers Brigade (16) and the Prisons department (4).

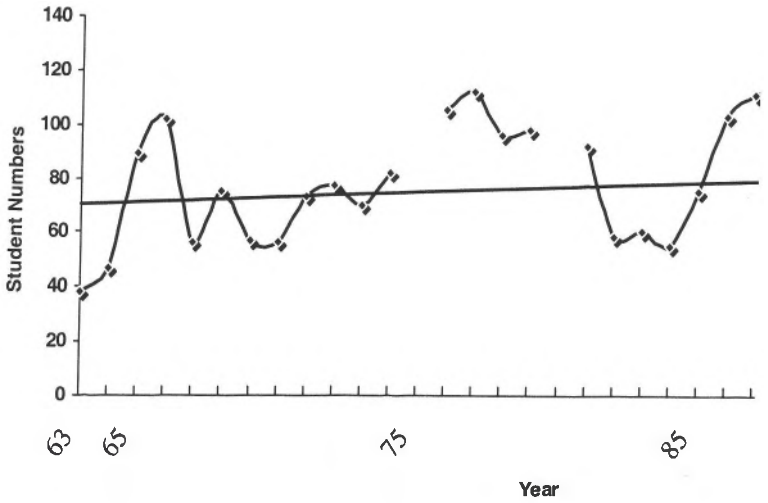
explained (Figure 1). What is clear is that the Farm Institute since its inception catered mainly for male students. Records show that a small number of female students gained access to the Farm Institute during the early years, although it is not clear whether special arrangements had been made for their lodging. The lack of gender-disaggregated data makes it impossible to trace the decline in female student numbers. However, it is known that during a ten-year period stretching from 1985–94 no females were admitted to WFI, and that the all-male intake was scattered throughout the remaining habitable dormitories. This trend was reversed with the arrival of the Project which, following ODA policy, placed a high emphasis on ensuring women's needs were also considered. The allocation of one of the dormitories to women trainees and the distribution of gender-sensitive publicity appears to have been sufficient measures to encourage females seek entrance on the training course.

In addition to the one year certificate course, shorter 'specialist' courses had originally been run by WFI. From 1964 the Institute was also offering a four-month training course for the Volta River Authority. Other short courses included poultry and livestock production. However, these appear to have fallen away fairly rapidly, as did the few courses for practising farmers also run at this time. By the 1980s, training functions had narrowed almost entirely to the running of the one year certificate course, a trend reversed only with the considerable influence exerted by the Project.

Indications of decline

In this section I discuss three themes which appear to characterise key aspects of the complex processes of decline that occurred within the Farm Institute between 1960s until 1994. This is done in the hope that a better understanding of what may be thought of as processes of decline will increase the possibility of identifying what is required to achieve development. The three themes are as follows; the commitment over successive decades to teach 'modern' and 'scientific' agriculture, the repercussions of the view that the farm institutes were part of a national programme of farmer training, and the narrow emphasis on their role as teaching institutions. All three themes are closely interrelated and may well, on further reflection, be seen to represent different facets of the same underlying process. Moreover, further exploration is also required to separate more accurately cause from effect in the observations presented below. What follows, then, is very much the first tentative steps in developing a framework for further analysis.

Figure 1. Chart Showing WFI Student Admissions 1963–95



The burden of modern agriculture

Many WFI reports, from the 1960s until the present, place emphasis on training in 'modern methods of farming'. The syllabus offered a very modernist approach to agricultural education reflecting production-oriented models of agricultural development, gave little emphasis to processing or marketing and drew nothing from local farming practices. This, in effect, represented the demotion of local and 'traditional' techniques to the status of 'the problem to be overcome', or at best, an irrelevance in the pursuance of increased productivity.

The promotion of mechanised farming, as an indication of this commitment to modernisation, is not surprising in this context. However, by today's standards the initial investment made in tractors and other farm equipment by (or on behalf of) the Farm Institute by is quite staggering, especially so in view of the contemporary comment that this equipment 'proved to be inadequate with the training programmes to be undertaken in view' and that efforts would be made to get more (WFI 1964:11). By 1964 the Institute could 'boast of the following tractors and implements: 1

Massey Ferguson 35, 3 Porsche Diesel Super, 1 Porsche Diesel Master, 1 Zetor Super, 1 International B450 Diesel, 1 International B275 Diesel, a mould board ridger, 2 disc ploughs, 3 disc harrows, a seed drill' and more besides (ibid).

However, the rapid decline into disrepair and disuse is equally graphic. By 1965 the total number of tractors had increased by one, but two were now reported as inoperable (WFI 1965:10). By 1969 it is reported that all tractors are broken down and 'once again Head Office will have to come to our aid' (WFI 1969:9), a plea that is repeated again and again during the 1970s and 1980s. By the 1980s it is reported that 'the breakdown of the tractors is regarding the progress of the Institute in so many ways' (WFI 1981:3). The report is not specific here but a wider reading indicates two negative impacts. First, and most obvious, is the decline in training opportunities in tractor operation, second, the increasing inability to make efficient use of its farmland either for production or for practical demonstrations.[5]

What becomes clear from reports of the 1970 and 1980s, and confirmed through the experiences of the Project, is the increasingly precarious predicament of the Farm Institute as a result of its total dependence on state finances and the increasing sense of desperation experienced by WFI staff in trying to resolve the many issues that consequently lay out of their control. As the Ghanaian economy plunged into recession so too did the Farm Institute, committed as it was to a modern and thus highly capital-intensive programme of agricultural training.[6] Today, the remains of this long, but ultimately unsustainable, investment into the promotion of 'modern agriculture' are still to be seen rusting in the grounds of the Farm Institute – a rather depressing but graphic indication of the past over-investment in an unrealistic and inappropriate vision of the future.[7]

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5. 'Tractor driving lessons leading to the acquisition of tractor driving licenses were not taught... there was not enough money to meet the gas bills' (WFI 1968:2). In 1982 it is reported that 'Practical training as far as field operations was concerned was not adequate due to lack of spare parts to repair our broken down tractors and implements.' (WFI 1981:4).

6. One clear example is that of restrictions on expenditure that have been imposed from time to time by central government, usually as part of a National Strategy to reduce anticipated shortfalls. Such temporary restrictions appear to have been commonplace in the 1980s (e.g. WFI Qr. June 1986 which refers to a 50% reduction in agreed estimates) but continued during the 1990's.

7. the mid-1980s with the Ghanaian economy in deep recession, it appears that life at WFI could not have got much worse: 'Unfortunately the roof of the workshop ripped off during the first rainstorm... However, we were not daunted', (WFI Qr. March 1984 P.2) 'The Massey Ferguson 165 had hydraulic failure so ploughing was abandoned. The

The Loss of Context

Initial ODA interest in WFI was due to the fact that it was explicitly labelled a farmer training institute, encouraging the expectation that it supported farmer training and learning processes in the Wenchi area. The reality turned out to be rather different. Indeed, one notable feature of WFI in 1994 was the absence of functional relationships between the Institute and other local service providers or community organisations. There were no links between the Institute and local extension service, with other divisions of the Ministry of Agriculture, or with the local schools.

During Project investigations on the issue of local linkages it is noteworthy that WFI was constantly characterised by the headmaster and other senior colleagues within the Ministry headquarters in Accra as a 'national institution' contributing to a 'national programme of farmer training'.(In reality, however, in 1994 the three farm institutes which made up the national programme, had a total intake of around 100 students). Whatever the merits of this perspective, it is clear that the nature of this discourse appears to have actively and purposefully discouraged any move to develop a sense of local accountability. [8]

This lack of a local context was reflected in many aspects in the life and performance of WFI. Students were recruited from a wide area of Ghana, with only one or two coming from local districts. Faced with such a far-flung intake, it is not surprising that there were no follow-up procedures for examining the impact of the training provided to students on the certificate course, and that assessment of the national programme was limited to counting the numbers of students that had been trained. Only in 1994, with the arrival of the Project, were WFI resources explicitly allocated

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department of Transport and Mechanisation was contacted to continue the ploughing. This could not be done due to lack of fuel in the District' (ibid.) 'Pepper seeds were sown later but could not emerge due to poor seed condition' (ibid.) 'The situation as usual is alarming. The voltage drop as not been rectified so it has been rendering night studies impossible. For lack of fuel the Institute at times work in total darkness for several weeks' (ibid. p.3) 'The taps continue to be dry and the public water pump is unable to pump water to the Institute...students are made to haul water from a nearby stream to the kitchen and for their private use' (ibid.).

8. The question of 'location' of the Farm Institute was a matter of much disagreement. There is little space to go into this issue here: suffice it to note that labelling of the Farm Institutes as 'national institutions', protected the controlling interests of the Directorate in Accra which in the context of increasing moves towards decentralisation feared that such institutions would be captured by Regional administrations. Questions of control of resource flow and accountability appear to lie behind much of the contested discourse.

for any kind of post-training follow-up. This was done at the Project's insistence.[9]

Perhaps, most significantly given the large size of the Institute, was the fact that in the minds of the local communities, WFI had almost disappeared from the scene as a local resource. In 1994 only one student from Wenchi District attended the Institute. Records indicate clearly that this process of insularisaton began during the 1960s as early attempts to develop adult farmer training programmes fell by the wayside.[10] 'Quick and dirty' surveys carried out by the project in Wenchi District in 1994 and 1995 clearly demonstrated that WFI had become a forgotten institution, with most respondents who recalled its presence uncertain as to its role and function.

This state of 'splendid isolation' has not proven irreversible. Between 1994–1997 the Project invested a considerable effort in exploring possible linkages between WFI and other organisations that may yet prove to be of mutual benefit. These include closer links with extension services, local farmer groups and the traditional council (see below). A number of the resulting 'new initiatives' have brought with them salutary reminders of the past. This includes WFI open day, which in the short term has proven effective in stimulating local interest in the Institute. Records show that an open day was first organised in 1965.[11]

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9. WFI was not alone in this regard for no such data was available for any of the Farm Institute's nor, it appears, the agricultural colleges. Wallace *et al.* (1996), indicate that a lack of impact data characterises many national AET systems in sub-Saharan Africa.

10. The development of adult farmer training programmes appears in the first instance to have been an opportunistic enterprise as the following extract taken from the first annual report of WFI makes clear.

> It was discovered that the Institute could do more than training 40 boys a year with the facilities so far developed and being expanded. Therefore it ventured into the pioneering task of organising Adult Farmers Courses The first one was organised for 25th–26th October, 1963. It was so successful that with the experience and popularity gained another one was held on December 6th–7th... (WFI 1964:3)

However, records indicate that involvement in this process of learning was at best patchy. Further training sessions took place the subsequent year, following a survey 'to give guidelines on which ...programmes could be conducted'. Thereafter, until the end of the decade, only in 1968 do records indicate that any further training course took place. No mention of adult farmer training is made in the Headmaster's handing over notes at this time (Akyeampong 1970).

11. An Open Day was organised for the 16th March to enable 'the general public to observe demonstrations and educational exhibits by the various sections...Approximately 600 people attended including the Regional Commissioners, Brong Ahafo, the American Ambassador, Nana Wenchihene and several local personalities...' (WFI 1965:5).

The failure to learn

Another far reaching impact of decline and retrenchment is reflected in WFI's inability to develop and sustain processes whereby the syllabus could be reviewed and renewed on the basis of perceived or expressed need.

Prior to 1994, the previous curriculum review had taken place in 1981. The review had involved the establishment of a syllabus review committee made up of four members of the farm institutes and one from Ejura Agricultural College who sat and redrafted the existing syllabus. The process of review was not consultative and did not entail discussions beyond the staff of the Department of Manpower and Training. There was certainly no attempt at this time to identify, define or model training needs of the prospective beneficiaries. And there was no attempt to consider teaching or training processes. The resulting revised curriculum, little more than a list of topics, hardly differs from what went before (MOA 1981). With the advent of the Project, new attempts were made to revitalise processes of curriculum review and development. These met with some success, but many staff remained unconvinced at the possibility of allowing prospective beneficiaries to participate in such processes.[12]

This weakness appears to have been compounded by the lack of investment in staff in-service training which, in recent years, has been largely limited to an annual week-long gathering of all the divisional staff. From the records and my own observations other provision for staff training and development is both *ad hoc* and limited.[13] Training

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12. At the 1995 annual in-service training week the Project raised the possibility of encouraging the present Farm Institute student intake to assist with the curriculum review. One retired senior member of the department, now acting as a consultant adviser scoffed at the idea and questioned 'How children could possibly be involved in deciding what they are to learn?'. Most farm institute students are over 20 years of age.

13. The provision for staff training and development appears from the records and from my own experience to have been limited. From the outset staff training appears to a have received much attention: 'This was one aspect of work which was vigorously tackled right from the opening and it was mainly organised, planned and implemented by Schroeder, the USAID Agricultural Advisor. Weekly teaching staff meetings and individual tutorials characterised Mr. Schroeder's approach to the task as these afforded him the chance to instruct the Agricultural Assistants on the best methods of subject matter detailing, presentation and teaching' (WFI 1964:2). Few mentions of staff training processes are made in either the quarterly or yearly reports after this.

opportunities WFI staff sought from the project indicated an interest in developing further technical competencies rather than new communication or teaching skills, in keeping with the modernist paradigm within which the Institute operated. On the other hand, however, it was clear that Institute staff had failed to make the most of local opportunities to develop new technical understandings. To cite one example, the extension service ran their training and visit courses in an open class room at WFI. Staff, though free to attend, never did.

A similar failure to learn from the experts could be seen from the lack of contact that tutors had with local farmers. In 1994, a programme of field studies for WFI staff was drawn up in an effort to allow them to develop a clearer picture of current farming issues and problems. The programme met with mixed success with some staff clearly stimulated by their field experiences. At the time it was thought that the programme offered a new approach to staff training and ultimately curriculum development. As it later transpired, similar efforts had been made three decades earlier with seemingly similar results.[14]

What emerges from the above analysis, is that WFI not only failed to become a 'learning institution', but in the process of decline and regression appeared to have lost any capacity to do so. Between 1964 and 1994 WFI appears to have sloughed off all those roles, responsibilities and relationships which would have provided the basis for its own sustained change and development and instead was reduced to a bureaucratic within the Ministry at large. As an agricultural training institution it was remained remote and isolated from the dynamics of change and development in the agricultural sector, with no involvement community or farmer organisations, no linkages with the extension services and no contact with local schools.

There is little evidence to suggest that the rapid and far reaching changes in the agricultural economy of Ghana had any impact on the form or nature of the Farm Institute training programme since 1980. The resulting irony is that the Institute is now teaching from a syllabus purporting to offer modern approaches to farming which, in reality, is so outdated and narrow in focus that it fails to meet many of the information and skill needs which have arisen from the integration of rural economics into the national

14. 'Visits to the former working places, homes, parents and guardians of students were conducted in the first and second quarters. The purpose of these visits was to give the staff an opportunity of studying the students background to assist in drawing up suitable course orientation plans so that they could derive the maximum benefit from their courses. The visits were sometimes gruelling and hard going but they turned out to be very beneficial and worthwhile.' (WFI 1964, p.3).

market economy, particularly in the areas of marketing and processing, business management and organisational skills.[15]

A further irony lies in the fact that despite denying the legitimacy of the basis of current farmer practices as the starting point upon which to develop new farming alternatives, WFI failed to demonstrate a better alternative even on the narrow grounds of 'improved productivity'. Whilst the Institute was committed to providing practical experiences in farming, its own dependence on high input farming meant that for much of the time it was 'strapped for cash' to purchase inputs, let alone the repair of mechanised equipment. Far from providing examples of excellence, the practical experiences students obtained from working on the school farm provided more salutary lessons, with outputs frequently far lower than would have been expected from local farms under 'traditional management'.[16]

Looking ahead: the future of agricultural education and training (AET) service provision

The foregoing discussion of Wenchi Farm Institute raises a number of issues that may be of more general significance in the debates concerning agricultural education and training. This section explores opportunities that exist to overcome the weaknesses in the provision of AET services that have been initiated. It shifts the focus of attention from the Institute itself to wider systems and processes of service provision. Reference to this broader perspective is necessary to overcome the myopic vision of service

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15.One incident stands out in my mind that appears to characterise the whole sense of timelessness that pervaded much of WFI. I came across junior member of staff referring to a small notebook in preparation for a forthcoming lesson. Since it was uncommon to observe any preparation of this sort I asked what he was reading. It turned out that he was developing a lesson plan based upon his own mother's notes made some 30 years previously when she had studied at agricultural college. The use of such reference material did not strike the young teacher as at all amiss.

16. I have no reliable production figures upon which to base this assertion and those reported in quarterly and annual reports are invariably vague. WFI teaching staff however indicated that this was the case and state that ineffective farm management (from input purchase, land preparation, through to storage) prevented any real yield improvement as a result of the adoption of new varieties and planting practices. Detailed analysis of farm production from the Graduate Farmers Training Scheme based at the nearby Ofuman Agriculture Project, indicates a similar gap between Project production and that recorded on nearby small-scale farms.

provision that presently appears to characterise institution-based approaches to AET in Ghana.

AET systems and learning processes

One idea I wish to introduce here is the notion that national agricultural education and training processes may be considered as a system: AET represents a complex web of interrelated educational activities which aim primarily to raise the productivity of the whole RNR sector in any country. Amongst other things, it seeks to enhance the food security and sustainable livelihoods of rural producers which lead to changes in their knowledge, attitude and skills. It is a central component in the broader 'rural knowledge system' which underpins agricultural production and rural development (Wallace *et al.* 1996:3)

In Ghana, as elsewhere, AET may be seen to provide for the learning needs of:

- rural producers and processors
- those who support rural production through e.g. provision of rural craft skills, small scale enterprises and marketing services
- professionals and sub-professionals who service the rural sector through e.g. research, extension, teaching and other support services
- children in primary and secondary schools who either learn about agriculture or are taught basic production skills as part of their core training
- young people who undergo some form of vocational education in preparation for a career in farming

For the purposes of policy formulation or strategic planning the notion of AET systems may be a useful concept. On the other hand, experience at Wenchi indicates that if it is presently a system, it is certainly dysfunctional, for the provision of AET in Wenchi, and indeed Ghana as a whole, is more accurately characterised by its piecemeal and fragmented nature, involving a great many institutions and processes.

In Ghana, AET is generally associated with the functions and activities of a narrow range of agricultural training institutions, namely agricultural colleges, farm institutes, extension services and agricultural education departments in universities. These institutions are still characterised by supply-driven services and this is reflected in the introspective and overly-bureaucratic concerns that dominate much of the local discourse concerning service improvement. As a result AET processes are

compartmentalised in the minds of planners and policy makers alike, and the systematic and possibly synergistic relationships that could exist between the various institutions remains largely unrecognised. In a context where service delivery is so fragmented, it is perhaps unsurprising that knowledge of impact of services is similarly piecemeal. To achieve a change certain steps need to be taken, not least the deconstruction of ideas and discourses that presently suggest that effective support to agricultural learning processes are inevitably tied to existing agricultural institutions such as WFI. A broader understanding of AET systems, should be helpful to ensure that planners remain cognisant of the potential role that a wide range of public, NGO and community based institutions have to play in service delivery irrespective of the ministerial tag, or departmental title, that serves to discourage more effective collaboration at various levels.

In addition to developing a clearer framework for assessing the relationships between different aspects of AET service provision, there is a need to better understand and explain agricultural learning processes, particularly among young people, and to use this as the basis of developing more effective policies, strategies and services to support prospective new entrants in establishing rural livelihoods. Such a commitment entails a radical departure from the institution-centred analyses that presently inform the debate but would, in turn, provide a clearer picture of the present role of institutions in the lives of rural people. Such an approach will require the adoption of actor-centred investigations into such topics as local knowledge systems, processes of socialisation and intra- as well as inter-household learning processes as they refer to agricultural and other rural enterprises.

The wider exploration of AET systems, along with actor-centred analyses of learning processes, appears to hold the possibility of clarifying the present impact of investments into agricultural education and training. The following sections indicate two contexts in which it may be appropriate to pursue such approaches.

Decentralisation and opportunities for local coordination of agricultural services

The possibilities of taking a broader view of AET systems has until recently been limited by the dominance of hierarchical bureaucratic structures and procedures, as evidenced in Government line ministries. Alternative delivery approaches, based upon an understanding of client learning processes, are still undeveloped and play little part in shaping strategies

for service provision. However, the move towards decentralisation, now underway in many countries, appears to offer planners and policy makers new opportunities to reappraise agricultural and other areas of service delivery, In the notes that follow, I briefly recount some of the steps taken towards developing horizontal integration of a number of the various stakeholders in AET service delivery in Wenchi.

In 1994 the Project took WFI as the starting position and asked, 'If WFI is to become an effective player in the provision of farmer training what characteristics will it require?' but did not initially ask whether an institution such as WFI was the most appropriate starting position for strengthening AET systems. Experience gained through the first phase of the Project, drew attention to the many policy level implications arising from developing a programme of institutional support and capacity building which indicated clearly the need for a more holistic approach to planning investment in improving services in agricultural education and training. By so doing, the role of the Farm Institute itself began to be questioned.

Through the search for a clearer meaning and more effective role for the Farm Institute, the project began to explore the potential relationships that could be developed between WFI and the various providers of agricultural services and, indeed, potential service users. These investigations were increasingly informed by an emergent idealised model of a district-wide AET service, which in turn opened up the opportunity to develop a better understanding of learning processes and knowledge systems within local communities.

In 1994, AET service provision within Wenchi District was characterised by its fragmented nature. A whole range of government agricultural services worked within the district, which at this time had little relationship with each other with regard planning, implementation or evaluation of service delivery.[17] In addition to these government services there were a small number of NGOs operating in an independent and uncoordinated manner in the area and a wider range of community based organisations doing much the same. Finally, there were limited linkages between any of these institutions and the formal education services, in particular the secondary schools, all of which taught agriculture as part of the core curriculum.

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17. As well as WFI, the following government organisations were represented in the District: Agricultural Extension Services, Crop Services, Irrigation Development Authority, Soils Research Institute, Crops Research Institute, Women in Agricultural Development, Policy Planning Monitoring and Evaluation, Forestry Extension.

The act of bringing together, in a meaningful forum, the various players in AET service delivery took time and effort. Participatory learning workshops were used to explore the existing nature of AET service provision. Through these participants, drawn from the local agricultural services, came to the conclusion that a more integrated and coordinated approach was not only desirable but achievable even given the limitations imposed by existing resources. The resultant forum, known as the District Agricultural Coordinating Committee, quickly took on a life of its own and started to push and pull the project into a new supporting role. By providing an open forum for these previously unconnected institutions, district-level officers were able to recognise that they not only had much in common regarding their professional concerns, issues and problems, but through sharing resources they could, as a collective body, start to provide a more effective range of services than would be possible by operating on an individual basis.

The Coordinating Committee explored a number of ways in which to achieve a better coordinated and integrated approach, including a multi-institutional forum to identify local adaptive research needs, a common fund to support community functions such as National Farmers Day, a joint and coordinated planning programme of farmer training events in the district and even an outline strategic plan for the development of agricultural production in the district.

The act of coming together has led to a number of changes in the operation of local service providers. Perhaps most significant has been the emergent possibility for service providers to start to get a sense of the 'big picture' of the issues and problems facing the agricultural sector in Wenchi District. This move to a more holistic approach to service provision has led not only to the development of joint cooperative ventures, but to also to a redefinition of the particular role that each institution has to play. WFI has developed a range of new services as a result of the emerging possibilities to make a contribution in the local context: the resources of the Institute are used increasingly by other service providers, both government and NGO, to run short courses, and Institute staff are increasingly asked by NGOs to act as facilitators on outside training courses.

Agricultural education in schools

The sharing of ideas and increased understanding of respective roles and responsibilities of each service provider not only helped to develop a clearer idea of the potential of each provider but led also to a reappraisal of other institutions whose contributions had thus far been ignored. One

result was that a number of farmer organisations were invited to join the DACC forum, bringing together for the first time, in a process of dialogue, service providers and representatives of service users. Likewise schools took on a greater significance. This initially came about as a result of investigating WFI student entry strategies and a concern to ensure that the Institute's curriculum, which was undergoing revision, complemented, as far as possible, those in use within the formal education sector.

The need for further information led to the undertaking of a survey to examine the nature of agricultural education within secondary schools in Wenchi district. The survey had the effect of placing the contribution of the Farm Institute in a new perspective altogether. In Wenchi district there is one farm institute with a capacity of 120 whereas there are over 70 schools teaching agriculture to thousands of schoolchildren. Secondary schools have a considerable potential in strengthening the capacity of local communities to manage their natural resources. The Project was also taken aback by the quality of agricultural training that many local school teachers had received. The survey even identified a graduate in tropical horticulture at a time when there was not one single horticulturist available to agricultural extension services in the whole Brong Ahafo region. However, one of the main findings of this survey was the almost total lack of support that these schools were receiving from the extension or other Ministry of Agriculture services.

One issue of particular concern related to the teaching of practical skills. Although the present agricultural curriculum in secondary schools is tied to a national curriculum, there is some scope to explore topics of particular local interest through practical farm work. Many schoolteachers identified this as a major problem area. The skills available within the formal agricultural services, including those at WFI, could be used more effectively to support the teaching presently provided by schools, particularly in on school farm activities. As a result, an initial workshop was held between representatives of the district education and agricultural services to investigate the possibilities of meeting some of the expressed needs of school agricultural tutors identified through the survey. Subsequently, a limited programme of demonstration plots at selected schools was established by the agricultural extension services, although clearly more should be done.[18]

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18. Initially, Project expression of interest in the formal education sector was not greeted with great enthusiasm within ODA, reflecting, I think, the difficulty in perceiving and supporting development processes that cross sectoral boundaries. At present, there is an inevitability that issues relating to AET services will fall between two or more advisers' desks lies, and this lies in its 'ambiguous position', as defined by the main

The position of secondary schools within AET systems is of particular significance for a number of reasons. Firstly, schools are among the most visible and, indeed, most common public sector infrastructure investments to be found in rural areas. Unlike many public services however, schools stand in marked contrast to, say Wenchi Farm Institute, in the extent to which rural communities may express a 'sense of ownership' of the institution and interest in the processes of service delivery.

It is also important to recognise that schools provide the first, and for many the only, formal teaching and training in agriculture received by young women and men before they take steps to establish their rural livelihoods. For the many 'new entrants', classified elsewhere as 'school dropouts' and 'school failures', the agricultural education received at school is 'vocational' by default. Schools are thus highly significant in shaping career and life choices of young rural people (Riedmiller 1995). Closer linkages between schools and specialist AET institutions, such as WFI, would appear to provide one option whereby the quality of support may be enhanced to enable young farmers to exercise effective choice and judgement in their early farming activities. On the other hand, there remains a clear need to investigate the changing role that schools and other institutional 'sources of influence' play in the process of learning and action (information acquisition and skills development, decision making, technology adoption and adaptation) amongst 'new entrants' in the agricultural sector. In summary, it is my view that a fuller understanding of the present learning strategies of young people remains the best guide to the further development of services to this section of the community, and to the particular role that specialist vocational training centres such as WFI may have to play in the provision of these services.

The future of WFI: a cautionary note

Over the recent years the extra capital investments, made through the ODA project have radically transformed the Farm Institute to give the appearance of a vibrant and effective training centre. Only time and well-executed impact analyses can tell whether the recent changes brought about at WFI will ultimately lead to tangible benefits for its range of potential customers. Early indications are positive, but questions of attribution for these 'early successes' still need to be examined in closer

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bureaucratic agencies. Once again, this suggests the need for a broader policy and planning framework to guide investment in this key area.

detail. And, as suggested above, until such time as a more holistic approach can be considered it seems inevitable that the particular changes taking place at WFI are likely to be limited in impact and, ultimately, not sustainable.

It is also worth recalling that many of the 'solutions' now offered to perceived problems at WFI have in fact been tried, or at least discussed, before. It is imperative to learn from the past to avoid being locked into an endless cycle of 'projectised' investments that attempt to rejuvenate particular institutions which, when assessed in the context of the broader policy environment, were not really sustainable in the first place. The use of project frameworks to direct development expenditure, in this context, must be handled with great care. They provide a rigid time-bound framework for assessing impact and investment, but these are directed at short term processes. Project frameworks appear less suited to the task of accounting for change over longer periods. Without due care, their use they can result in short term investments, made without reference to the longer term historical context and thus marred by a failure to learn from the past.

Finally, one feature of change at WFI has been the wide discussion among staff of many themes implicit in the forgoing analysis: accountability, participation, sustainability and so on. But, as in much development discourse, adoption of new words is rarely matched by a shared understanding of their meaning, a result of different 'stakeholder interests' and the relations between them. When all is said and done, WFI is still defined as a 'national institution', is almost wholly dependent on central government funding with a staff directly answerable to a Director in Accra. There remains a widespread gap in the interests, understandings and expectations of the WFI and those of its putative end-beneficiaries and in particular local people. Until these gaps are bridged, institutions such as WFI will offer but limited new or sustained opportunities to 'sow with skill and reap with joy'.

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9

Understanding Market Relations and Bargaining Power: Farmer-Trader Interactions in Agricultural Development in Brong Ahafo Region Ghana

Fergus Lyon[1]

Introduction

An understanding of market institutions is vital for the development of a coherent rural development policy that aims to reduce rural poverty and improve urban food supply. This paper draws on studies of the vegetable marketing system in Ghana that explore the issues of farmer-trader interaction and the impact these have on agricultural development in the Brong Ahafo Region, a major vegetable growing area. The work adds to several current debates in development thinking particularly the role of market access in stimulating agricultural intensification and increased production. The research shows the importance of studying the complexities of market systems and exchange relations. Of particular importance is the analysis of bargaining power as changes to this can have a very large impact on farmers' incomes.

It is also necessary to understand the many roles of traders which go beyond the buying and selling of produce and include a range of post harvest activities and support functions for farmers. Traders are therefore active agents in agricultural development and their role, whether beneficial or restrictive, has to be recognised. The research shows that market access is shaped by the organisation and institutions of the market. While a range of institutions have developed that act to minimise the transaction costs in

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marketing, their evolution is also dependent on the social and cultural settings within which they are embedded.

The paper starts with a background to the vegetable production and marketing systems, before looking at the factors that affect the bargaining power that farmers and traders can draw on. This will include a detailed discussion of the organisation of Ghanaian markets and the role of farmer and trader associations. In the final section, I shall examine the policy implications and the role for external intervention.

This research work aims to explore some of these issues by studying the vegetable marketing system. This was done by interviewing 120 farmers and 70 traders, on the farms, in the villages and in the market between April 1995 and August 1996. The work took place in five districts of Brong Ahafo (Sunyani, Wenchi, Tano, Techiman and Berekum) and Kumasi and Accra market. Semi-structured interviews were carried out with key informants and others selected using random walks through villages and farms. Particular attention was given to the farmer-trader interaction with weekly monitoring over a six-month period of 60 case study farmers throughout their harvests. Observations of marketing operations were documented and investigated while working in the markets and staying in the villages. Close links were developed with the traders associations in Sunyani and Kumasi. Price data used to calculate the margins was collected daily in Kumasi and Accra and Sunyani.

Background

Vegetable production in Brong Ahafo forms a major part of the vegetable supply to urban areas in Ghana. This study concentrates on the supply to populations in Kumasi and in Brong Ahafo Region. Vegetables considered in this research include tomato, garden egg, pepper and okra and they form a major part of the Ghanaian diet amounting to 9.6% of average annual household food expenditure and 4.9% of total expenditure in Ghana (GLSS, 1995).

The vegetable production area is on the border of the transition and forest zones. In recent years the changing land use has meant that the division between transition and forest ecological zones is becoming unclear.

Vegetable production in the study area is an important part of rural livelihoods. A survey in 1994 found that 62% of women and 58% of men were growing vegetables and of respondents who were producing vegetables, 42% had it as their main source of income and 43% had it second (Sherrington and Suglo, 1994). The agricultural systems have been

through dramatic changes since the 1980s. Partly this was due to the destruction of much of the cocoa growing areas in widespread bush fires of 1982–3. Many cocoa farmers moved into maize and, more recently into vegetable production. However, there were also dramatic policy changes with the introduction of the structural adjustment programme that reduced the subsidy on inputs. Other crops grown in the area include cassava, yam, plantain, cocoyam, cowpea, ground nut, tobacco and oilpalm.

There is a wide range of farmers with differences in access to resources producing vegetables in the study area. These range from those growing for consumption and selling any surplus in local markets to the more commercial urban marketoriented farmers. The former are all women and tend to intercrop vegetables with other staples and use very few inputs. Income from the small sales are important for household requirements and school fees. The commercial urban market oriented farmers are older women and younger men. They tend to have larger scale monocropped farms ranging from half to four acres. Considerable amounts of inputs are used including inorganic fertiliser, pesticides and irrigation in the dry season. The commercial farming is concentrated in certain villages that are suited to vegetable production as well as having a reputation for producing certain vegetables and links to the market traders.

All the traders are in the private sector, selling in domestic markets and almost all are women working alone or occasionally in pairs. The urban market oriented farmers sell at the farmgate to itinerant traders (*nkwainsofo*) who are based in the urban centres or in the same village as the farmer. The itinerant traders take the produce directly to the retailing markets and do not pass through any relay market. There are also rural assemblers and local markets for the smaller quantities.

There has been a long history of commercial agriculture in the study area dating back to the colonial times with the production of rubber and cocoa. The vegetable market system has not been regulated at any time and has developed its own unique institutions that allow the traders to cope with the high risks of marketing perishable produce and maintain their market positions. The high transaction costs entailed in marketing come from the poor information supply, buying from a large numbers of scattered small scale producers, no quality standards and severe restrictions on access to capital. The uncertainty and complexity of the market system can be seen by the dramatic daily changes in prices and margins in some of the markets.

Traders have often been cast as exploitative, profiteering and cheating by the media and politicians. This paper will examine the differences in bargaining power and the extent of cartels, barriers to entry and price manipulation. There is a need to understand the processes involved and

the wider roles that the traders and the associated institutions play in agricultural development.

Bargaining power in markets

While the factors of demand, supply and transaction costs play a role in shaping market institutions, power relations and unequal bargaining positions shape the prices that farmers and traders get (Harriss, 1993). It is therefore necessary to understand the differences in bargaining power, how farmers and traders can change their bargaining positions and how the resources that they can draw on are affected by their gender, age, ethnicity, wealth and social position. This will identify areas where farmers' bargaining positions can be strengthened without making vegetable trading unattractive to a large number of traders.

Control over supply

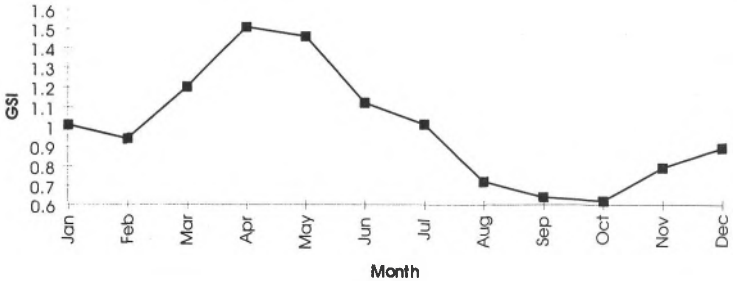
Control over supply is the main source of power for farmers but this is limited by the perishable nature of the crop. When there is a glut on the market and many farmers with ripe produce waiting to harvest, traders can dictate the prices and farmers have to accept. There are no means of storage and processing. However, in periods of scarcity, those farmers who are producing can set a much higher price which the traders have to accept. The seasonal indices for tomato prices in Figure 1 indicate the changes in supply. These periods tend to be at the end of the dry season and the beginning of the wet season and are only available to farmers who have access to irrigation. This is restricted to those who are physically strong enough to do the manual bucket irrigation themselves or for those with capital to invest in hiring labour or water pumps as well as chemical inputs.

Access to information

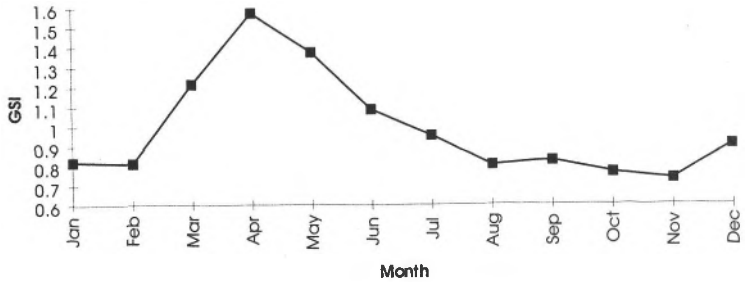
Information is seen as the most important resource by both the farmers and traders. As Alexander and Alexander (1991) note in Java, it is during short periods of poor information flows that traders can make windfall profits which are the main part of their income. This is evident from the wide

Figure 1: Seasonal Price Indices

Grand Seasonal Index for Tomato Wholesale Prices in 1983 - Sept.



Grand Seasonal Index for Tomato Wholesale Prices in Ghana, Dec 1983 - Sept.



Grand Seasonal Index for Tomato Prices in Sunyani, Ghana, 1983 - Sept.

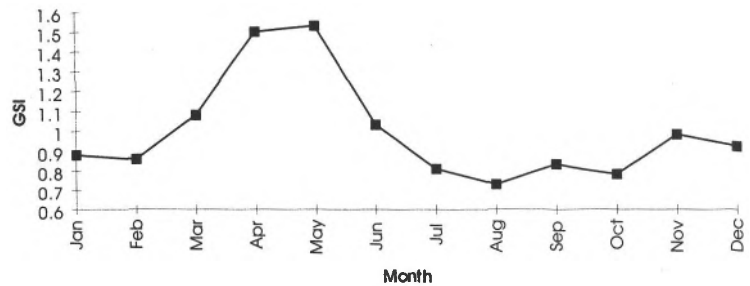


Table 1: Marketing margins between Brong Ahafo and Kumasi market June–July 1996 ('000's of Cedis for 75 kg crates)

Date	Where bought	Price bought at farmgate	Price in market	Transport, tax, fees	Maximum margins possible
17–18 June	Manso	45	47	4.5	-2.5
2–3 July	Dwomo	25	22	4.5	-7.5
21–22 July	Manso	28	35	4.5	2.5
22–23 July	Dwomo	22	40	4.5	13.5
22–23 July	Manso	30	40	4.5	5.5
28–29 July	Manso	24	30	4.5	1.5
29–30 July	Dwomo	20	30	4.5	5.5

range of marketing margins shown in Tables 1 and 2 and the wide fluctuations in prices. Information is needed on supply conditions in the producing areas and the prices in the markets. With this information they have a better understanding of what the other party is likely to accept.

However, the marketing system is characterised by poor communication and information is spread through personal links between traders, and between farmers and traders. Access to information is limited as produce passes straight from the producing areas to the consumer markets, without passing through any assembly market. This is shown in Figure 2 with the distinction made between a redistributive system with assembly markets and a two level system that is found in the vegetable markets. While the two level system allows produce to be passed through the marketing system without delays, it can limit the information available as farmers and traders would only have direct knowledge of the supply conditions in any one market and the demand conditions in any one town (Warburton and Lyon, 1995).

Table 2: Marketing margins between Brong Ahafo and Accra (Makola) market. June–July 1996 (000's of Cedis for 75 kg crates)

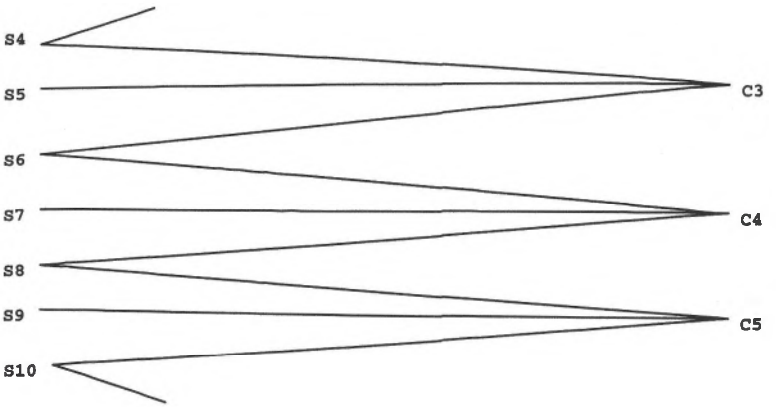
Date	Where bought	Price at farmgate	Price in market	Transport, tax, fees	Maximum margin possible per crate
9–10 June	Dwomo	48	65	8.5	8.5
10–11 June	Dwomo	50	60	8.5	1.5
12–13 June	Dwomo	60	62	8.5	-6.5
16–17 June	Dwomo	55	80	8.5	16.5
17–18 June	Dwomo	50	80	8.5	21.5
23–24 June	Dwomo	60	65	8.5	-3.5
24–25 June	Dwomo	60	65	8.5	-3.5
26–27 June	Dwomo	40	68	8.5	19.5
1–2 July	Dwomo	30	55	8.5	16.5
3–4 July	Dwomo	35	60	8.5	16.5
8–9 July	Dwomo	52	75	8.5	14.5
10–11 July	Dwomo	60	80	8.5	11.5
17–18 July	Dwomo	20	82	8.5	53.5
21–22 July	Dwomo	20	50	8.5	21.5
22–23 July	Dwomo	20	45	8.5	16.5
23–24 July	Dwomo	25	40	8.5	6.5
29–30 July	Dwomo	20	38	8.5	9.5

Note: the price given in the market is for good quality produce at the beginning of the day. The price is lower for poor quality produce and for crates that are not sold at the beginning of the day. The margins given are therefore the maximum possible and could be lower.

Figure 2: Redistributive and Two Level System (after Jones 1972, Chart 1, p112)

Redistributive System

Two-Level System



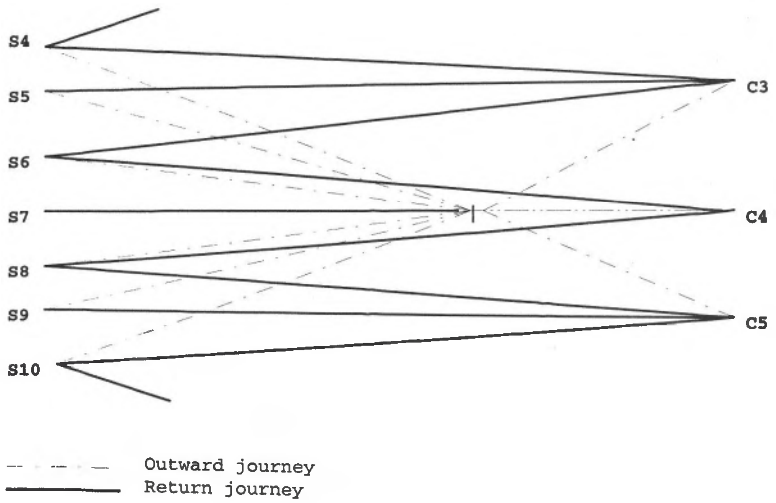
S = centre of supply; C = centre of consumption; I, K = relay markets

Traders build up links to other traders in the same market. They are members of the same association and see each other as colleagues rather than competitors; the sharing of information is often based on reciprocity. Outside the market, traders can get information when they meet on the way to or from producing areas. Traders from the south of Ghana often get information from Kumasi when they stop to arrange transport or collect crates. The key location is the 'Awanaga' area where tomato crates are made and cargo vehicles have their union branch. This can be described as a modified two level system as shown in Figure 3.

The itinerant traders also have links to certain farmers who send messages to them when the harvest is starting. Farmers come to the market when there is a large supply in the producing areas. In such cases the traders know they are in a stronger bargaining position and so they can fix a lower price before they agree to leave the market with the farmer. In one case the price of a crate halved over three days: 'farmers had to go to

Kumasi Awanaga to arrange for buyers. We were only able to get one lorry so the traders took advantage to cheat us'. Bargaining is an important means of learning how keen the farmers are to sell. If they accept a price quickly then the traders know there is a large supply on the farms.

Figure 3: Modified two level system (from Warburton and Lyon, 1995)



S = centre of supply; C = centre of consumption; I = Information centre (Kumasi)

Farmers get information by going to other villages and sending representatives to urban markets. This can be limited because of distance especially in more remote villages. Otherwise they have to judge the demand and prices in the urban markets by the number of traders coming to the village and also by the way that they bargain. They tend to have less information as they are not as mobile as the traders and they may not have the more recent prices. They are therefore in a weaker position when it comes to bargaining.

Access to transport

The main transport used are trucks that are hired by the traders in towns. Farmers are constrained as they only produce small quantities and cooperative associations have not been successful. Furthermore there are

restrictions placed on farmers and non-registered traders bringing in large quantities to the markets. They can either be barred from selling or forced to sell through commission agents and get very low prices. This will be discussed in the later section on the organisation of the market. The access to transport in Kumasi and Accra markets also requires links to the Ghana Private Road Transport Union who organise the drivers.

Access to transport to the market is limited for those farmers producing vegetables far from the road. They will have higher costs as they have to carry the produce to the road. They will also be in a weaker position as the traders will prefer to go to those farmers who are more accessible. However, there are certain inaccessible villages which are well known as vegetable producing areas, especially in the dry season. In such places there are enough farmers harvesting so that the traders can be confident that they can fill their lorries.

Knowledge of the market procedures and requirements

Farmer are in a much better bargaining position when they have the preferred variety of crop for the traders. There are a range of varieties and landraces of each of the vegetables grown in the study area. Certain varieties are grown for specific markets. The garden egg variety *obolo*, for example, is mainly used by the people of southern Ghana as they have different dishes. There are also certain tomato varieties that have better post harvest qualities. Traders play a role in distributing these new varieties to farmers they have 'customer' links to. Farmers will also try to ensure that those growing vegetables around them will also grow the same variety so that the area gets a reputation for good quality produce and attracts more traders.

Traders develop marketing skills that allow them to bargain more effectively. These include the judging of quality and quantity as well as accountancy skills. Traders learn these skills through experience. Older traders will pass their business onto their daughters or other relations. They will spend several months or longer together so that the daughters can learn the skills and meet the 'customers'. Other important skills include the knowledge of the different bargaining procedures at different parts of the marketing chain as there are different rules in each market. The bargaining procedures can also change within the year as crops become scarce. For example the unit of sale for garden eggs changes in Sunyani market with scarcity and the definition of different stages of ripeness are redefined as the garden eggs become more scarce (Clark, 1994). Finally traders and farmers can benefit when they can speak a range of languages.

In the Accra markets, traders often try to intimidate those who they are bargaining with by talking in the Ga language.

Control of capital

Access to capital and the costs of inputs are considered the greatest constraint by the farmers. Most itinerant traders will be involved in providing credit and some inputs to certain farmers with whom they have developed a customer relationships. The benefits for them are in terms of a greater profit when buying from the farmers at harvest time but equally important is the guarantee that the farmer will sell some of the harvest to the trader. There are a wide range of contracts with variations in the repayment and the extent to which the farmers are committed to sell all their crop to one trader. However, there were no observed cases of farmer dependency on certain traders or patron-client relationships that lead to what Bhaduri (1986) refers to as 'forced commerce'. Cases where this has been reported in West Africa and elsewhere show that this happens when the traders were already the dominant party before they took on that role (Watts, 1983;1987; Clough, 1981; Olsen, 1993). However, once in such agreements, the farmers are in a weaker bargaining position.

The direction of credit flows can change through the season. Traders may give credit and inputs to farmers when they plant their vegetables and then be repaid at harvest time. In addition, farmers can give the traders short term credit by allowing them to take their crops to the market and be paid later. This allows the traders to sell a larger quantity than they would be able to otherwise with limited capital. By giving the crop on credit to the trader the farmer is able to build up good links. However, the traders can pass some of the risk of marketing onto the farmers as the traders can claim the price was lower in the market. Occasionally they never return with the money. However, the traders recognise the importance of the 'customer' relationships as a survival strategy especially when they have made large losses and need to recover their capital.

Organisation in the market

Farmer associations

In the villages which are more established as vegetable producing areas, there are informal farmer associations that allow the farmers to strengthen

their bargaining position and set a price for all the village. However, this is only possible when there is certain amount of scarcity in the national markets and there are many traders trying to buy. At other times, especially when there is a glut, with ripe produce waiting to be harvested and not enough traders visiting the farms, some farmers will be willing to sell at a lower price than the agreed one rather than let their crop rot in the field. Secondly, farmers may be forced to go below the set price as they are selling to one of their 'customers'. For these reasons formal farmer associations for perishable vegetable crops have failed in the past. Farmers have found that they cannot enforce a single price for the village and they cannot stop farmers getting credit from the traders when there are so few other sources available.

The associations function by selecting several farmers to bargain on behalf of all the others. In some villages there is a 'chief farmer' who is always involved. The other negotiators tend to be those who are good at bargaining and who have a large amount of produce ready to be harvested. Once the price is set the farmers are allowed to get the boxes or bags from the traders and start harvesting. In two of the main garden egg producing villages, Offuman and Abesim, the informal association has allocated farmers certain days of the week for harvesting in order to reduce the gluts that can occur on a single day. This was done on the request of the market traders. Associations also play a role in disseminating information on supply conditions, improving the quality of the varieties/landraces being grown and building links with trader associations so that they can settle disputes and collect debts.

Trader associations

While the Ghanaian vegetable markets appear to be disorganised and chaotic, there are always strong underlying traders' associations that operate in all of the larger markets. Similar associations are reported in other West African markets (Smith and Luttrell, 1994, Dennis and Peprah, 1995, Saul, 1987).

Selling in the markets can only be done by members of the association or through them. The control over the supply coming into the market combined with their role of fixing the daily price every day gives a large amount of bargaining power to the traders, although this does change over the year as produce becomes more scarce. The extent to which non-members are excluded differs from market to market. Initial studies suggest that Kumasi is more open than others while Accra markets, especially 31 December market, has stricter rules and stronger barriers to

entry. The extent of the barriers to entry for itinerant traders and farmers will depend on the balance of power between the retailers and the leading itinerant traders or commission agents. It is also based on the physical structure of the market and the locations where produce can be unloaded. The key question here is whether this is simply a way of minimising the risks by stabilising the supply or a cartel that allows the traders to make excess profits and exploit the other actors in the system.

Control is exerted by maintaining a group identity. The attendance at, and contributions towards, funerals of traders or their relatives is the most commonly cited role of the associations. This acts as a bonding activity amongst them. Having built up these social relations, it is then easier to enforce group decisions on access to the market, prices, and makes it easier to have credit flowing around the market system. Similar functions were found in associations of traders in Ibadan, Nigeria (Smith and Luttrell, 1994). The unity is also helped by the ethnic and gender homogeneity (Clark, 1994). Those who break the rules are liable for a fine, either in terms of cash or produce, or banning. Disputes are settled openly and often the greatest risk is that of getting a bad reputation which would limit future possibilities and support in times of trouble. Control can also be exerted by lobbying officials when there is any threat to their business.

As Clark (1994), in her detailed study of the Kumasi Central Market, points out, these associations draw on organisational form and terms from both the traditional chieftaincy institutions and modern institutions such as cooperatives. There are associations for each agricultural commodity or a group of similar ones such as the Vegetable Sellers Association. They are centred around the *ohemma* or queen mother, commonly referred to in English as the market queen, who is elected by the other traders according to her ability. There are a group of elders who assist the market queen and, in the larger markets such as Accra and Kumasi, there are secretaries (usually men) who keep the records and note the daily transactions in case there is dispute later. The associations are closely linked to the paramount chief of the location who can play a role in regulating some of their activities (Lyon, 1997).

Associations are also the arena where the two main groups of members, the retailers and the itinerant traders who sell to the retailers, negotiate the daily price. Associations also play a role in dispute settlement amongst members, negotiations with transport operators, representing the traders in dialogue with local officials and lobbying for better infrastructure.

Conclusions and policy implications

This research shows that the social relations in marketing play a major role in how markets evolve and develop. Markets are not the impersonal arenas where buyers and sellers meet but a social and political process based on very different power relations and drawing on a range of institutional arrangements from both traditional structures and modern organisations. It also shows how complex and intricate the vegetable markets are in Ghana.

The analysis of the present methods that farmers and traders use to gain more bargaining power can be used to identify future roles for external assistance. Efforts to change the balance of bargaining power should be based on a thorough understanding of the different needs of types of farmers and types of traders. Some farmers are in weaker bargaining positions than others and this is based on their links to the markets and often the size of the vegetable farms. There are also differences among traders with the level of risk being much higher for those who buy from the farm gate and transport to the urban areas. The analysis also identifies the range of existing institutions that have developed and within which intervention has to be situated.

The perishability of the crop creates many constraints for both the farmers and traders and can increase the costs because of the risk of post harvest losses. These are in the form of lower prices as very little produce is ever thrown away once it has been harvested (Lyon, 1997). On going research projects are now looking to improve post harvest qualities of crops and design technology that allows the farmers and traders to add value to their crop. Processing of crops is limited in the study area and there is potential for increasing this. While identifying new agricultural technology, traders, as well as farmers need to participate (Lyon and Biney, 1996; Compton, 1997). Increasing farmers' control over the supply is much easier when there is less of a glut so attention needs to be given to increasing irrigation while paying considering to the environmental consequences and the differences in the access to necessary resources within the farming community.

Better information sources for farmers and traders could help match demand and supply in the short term. At present these sources are limited and often based on personal links and networks which can be limited for farmers, especially those in remoter areas. Improved communications between producing areas and urban markets are necessary. The price information for vegetables has to be very timely with very dramatic daily price changes. Marketing information systems need to be devised to get the relevant information to farmers rapidly.

It must also be recognised that many of the institutions are not evolving to minimise their transaction costs alone but the agents involved are using their greater power in the market to maintain their position. There is a need to assess the roles of traders and their associations. Are they there to minimise risks and would restrictions on their activities reduce the number of traders and therefore reduce the competition and prices received by the farmers? The role of traders in providing inputs and to farmers should be appreciated and also their role in the dissemination of new varieties. While some can benefit from getting credit from traders, this is limited, especially for those growing for consumption and local markets.

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10
Participatory and Interdisciplinary Research in Practice: a Case Study from Coastal Ghana

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Introduction

This chapter reviews interdisciplinary work conducted under an ongoing DFID-funded research project in coastal Ghana.[1] The research explores the potential for grass-roots participation in environmental resource management and planning in the context of Ghana's decentralisation programme. The chapter begins with a brief synopsis of Ghana's coastal environment and the institutional context of the research. Specific activities being undertaken and the participatory methodology employed are then considered. This is followed by an examination of the interdisciplinary approach to research and a discussion about innovative ways in which the research can be taken forward.

Background: Resources and institutions in coastal Ghana

Ghana's coastal communities of subsistence artisanal fishermen and farmers, fish-smokers and salt producers are dependent on the coastal lagoon, marine and land resources in a very complex multiple-use system (e.g. Armah *et al.*, 1996; Overa, 1995). This is a poor, densely populated region. It contains 25% of Ghana's population on 6.5% of its land area, and average welfare levels among coastal food farmers are estimated to be 12% below the national average, and 38% below that of large urban centres

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1. DFID NRSP Land/Water Interface Project R6777. The Department for International Development can accept no responsibility for any information provided or views expressed.

(Hewawasam *et al.*, 1996). Pressures on environmental resources are consequently substantial and a variety of changes – both internally and externally generated – are being experienced (Porter *et al.*, in press).

Decentralisation policies provide an institutional context which must also be considered. Environmental management in Ghana is the remit of the Ministry of Environment, Science and Technology, with the Environmental Protection Agency (EPA) as the implementing agency.[2] The Ghanaian government's decentralisation programme – established in 1988 – has involved the creation of District Assemblies which are being given increasing responsibility, including the management of the environment. District Assemblies have been required to establish District Environmental Management Committees (DEMCs), and to promote Community Environmental Committees (CECs), in an attempt to encourage popular participation at grass-roots level. This has created some tension between the EPA and the District Assemblies, since neither has sufficient funds to support these committees. Act 462, which brought the committees into being, apparently does not consider funding arrangements (Porter and Dzietror, 1996; Porter and Young, 1997).

The project focuses on the two interlinked issues, resources and institutions, outlined above. Research involves, first, analysis and monitoring of conflict between resource exploitation and environmental protection, using participatory techniques, and, second, analysis and monitoring of institutional behaviour and capacity in the context of national decentralisation policy, notably through monitoring DEMC activities. Work is restricted to three districts in three regions along the littoral: Keta district in Volta Region, Dangbe East in Greater Accra Region and Gomoa in Central Region (see Figure 1). Although all are coastal, the three districts vary in a number of respects. They each belong to a different language/culture group (Keta is Ewe, Dangbe East is Adange and Gomoa is Fante). Their physical environments also differ: Keta and Dangbe East both contain substantial brackish water lagoons (Keta and Songor lagoons, respectively), each of which are designated as RAMSAR sites (i.e. wetlands of international importance according to criteria established by the RAMSAR convention). Gomoa contains only relatively small lagoons and small portions of the Muni lagoon (a third RAMSAR site).

2. EPA's interests in the coastal zone are substantial and focus around the GERMP (Ghana Environmental Resource Management Project).

Figure 1: Map of Ghana Showing Study Districts

In environmental terms, Keta district is preoccupied, perhaps above all, by its marine erosion problems which have threatened the district headquarters, Keta town, for much of this century. The district is the site of extremely intensive agriculture (shallots, peppers etc.) along the densely populated Keta sandbar, irrigated by water from a shallow fresh-water aquifer. This contrasts markedly with the sparsely populated inland areas at the back of the lagoon where water supply is generally difficult and

agriculture relatively poorly developed. Agriculture, fishing, fish-processing and trade are the principal activities of the district.

Neighbouring Dangbe East contains a substantial portion of the Volta estuary and river pollution is considered to be one of the district's principal environmental problems (others being poor sanitation, deforestation and overfishing). Like the back-lagoon areas of Keta district, many parts of this district suffer shortages of potable water. Apart from fishing, fish processing, farming and trading, small-scale salt production is a major seasonal local activity in Songor lagoon. Stock raising is also important in many areas because the zone is relatively tsetse free.

Gomoa district, to the west of Accra, is less densely populated than the two districts to the east. Apart from the coastal settlements, it is principally a farming district (maize and cassava) where land availability allows the widespread practice of shifting cultivation methods. Its environmental problems include sand winning (for construction purposes), bush burning and deforestation. In some inland areas (for example around Obiri) gully erosion is severe. Gomoa is probably one of the poorest districts along the coast of Ghana.

Participatory research and database construction in the three districts

Wide-ranging activities are being undertaken in this project within the two interlocking research foci, institutions and resources. One of the principal activities is the recording of local knowledge of resources – use, flows, management and constraints on use. Most of this work is concentrated in eight settlements in each district: some are coastal, others inland; some are on major roads, others are only accessible with difficulty (in one case only by boat). Our approach has been to undertake qualitative research, including focus group work and in-depth interviews, with as wide a range of people as possible in each settlement – women and men of different ages, economic and social status and from varying occupations – and to construct from this a participatory database (using Microsoft Access). Where there are markets we visited on market day for discussions with market queens, women traders and customers, and thus explored resource flows through markets. Local women have been employed in some sample markets to record produce prices using a simple spring balance.

Participatory resource mapping with villagers has often been a starting point for detailed discussions of resource access. Villagers have drawn their own maps, in some cases in the sand using sticks or fingers, in others

on concrete floors with chalk; only rarely on paper using pens or pencils. We have also undertaken participatory 'perambulations' with groups of villagers - sometimes men or women only, occasionally mixed groups - when we have asked villagers to show us what they consider to be important features of the village and its lands, areas with environmental problems, resource access problems and so on. These are a useful complement to more conventional transects.

On early perambulations in the settlements we took photographs and later returned these, not just to make people a gift for their cooperation (though they are often much appreciated), but also as a starting point for further discussion of environmental/resource issues. We have also returned copies of the preliminary database printout to some settlements (all will receive copies before the end of the project) so that they have a permanent record of our discussions and an opportunity to correct any errors we have made in entering their information.

In some settlements, where there has been specific interest in/demand for additional work, we have set up participatory farmer and fish processor record keeping trials. A few successful farmers in the very intensive farming region along the Keta strip already keep basic records of rainfall and crop yields. They are keen to find ways of extending data collection on inputs and outputs, which they perceive will be of value to them in making production decisions. We are trying to develop this recording work with these farmers and have found other farmers interested in attempting record keeping (including farmers who cannot write). The recording has included information on artificial fertiliser use and pesticide applications, which will be valuable because of concern regarding the level of use. A few women fish-smokers are taking part in a similar experiment to record fuel use (type of wood, quantities and yields). Participatory on-farm fertiliser/manure trials are also taking place in one settlement where fertiliser use is heavy, in order to assess the relative merits of different combinations of fertilisers and manures. These have attracted substantial interest among local (male and female) farmers and have been used as demonstration plots for University of Ghana agriculture students. While the trials have been established primarily in response to local demand for assistance, the results are of great interest to us, not just in terms of data collected, but also in terms of the success of the methodology employed.

In the Keta strip our work has extended to include hydrological studies, in collaboration with the Ghana Water Resources Institute. There are potential problems along the strip as water use from the shallow fresh-water aquifer underlying the strip increases. A World Bank-assisted well-sinking and electric pump programme (now temporarily halted until hydrological investigations are complete) appeared to pose a threat to the

intensive agricultural system on which much of the local population depends (Porter *et al.*, in press). Local farmers have collaborated with this work (though not all believe there are any dangers in increased rates of water extraction, despite evidence of saline intrusion in some wells.)

Our institutional research on environmental management is broadly based, with studies at central, regional, district and village level. We have undertaken in-depth interviews and group discussions with staff at EPA headquarters and a range of ministries in Accra, at the EPA regional headquarters, and with District Administration staff and DEMC members in the districts. This has been followed up over the year through discussions with villagers in the three districts, in order to gain an impression of impact at local level. Our conclusion, to date, is that DEMCs suffer from a lack of funding and have generally had remarkably little effect regarding decentralised environmental management, though there is some variation between districts attributable to local circumstances (Porter and Young, 1997).

Archival work has provided an important backdrop to the participatory field studies. There is substantial material pertaining to resource availability, management and conflict in Ghana's national and regional archives, complemented by colonial archives held at the Public Record Office and Rhodes House, Oxford. Quarterly reports, handing over reports, and special reports on specific issues by district commissioners and other administrative officers in the colonial service provide a fascinating insight into environments and resources from a colonial perspective. Native Affairs records, which include correspondence from local chiefs and other interested parties, give some indication of local perspectives. There are files on coastal erosion, fuelwood, agriculture, water supply, soils, economic surveys and a host of issues which still resonate in these districts. Files on the Songor lagoon salt industry, for example, chart the complex negotiations which have surrounded bitter disputes over salt tolls and illustrate effectively that conflicts over resource control and access are by no means a new phenomenon in Ghana's coastal zone.

Detailed analysis of the results generated by the activities described above is still in progress, though we have presented interim findings at various stages to the EPA, district administrations and villagers. Maintaining a participatory approach is certainly time consuming and complex but, we feel, extremely rewarding in terms of the richness of the data we have collected and the interest in the project it has generated.

Reflections on interdisciplinary participatory research

There is currently considerable emphasis on the need for interdisciplinary research in environmental science and its value, particularly in a systems context, is apparent. However, much of the work being undertaken in projects involving a number of disciplines is probably more appropriately designated 'multidisciplinary' than 'interdisciplinary' (Epton *et al.*, 1983), i.e. disciplinary teams or individuals work on their own specific research problem/area in the field and report separately. Subsequent coordination may bring this work together to provide cross-disciplinary insights.

The relative lack of truly interdisciplinary research is possibly partly attributable to the prevailing research climate in universities, where there may be questions regarding the legitimacy of the product in each discipline - and difficulties regarding publication in disciplinary journals (Pratt, 1996). It also seems, in some cases, to be due to difficulties of mutual understanding which are experienced when researchers from different disciplines meet together in the field. These difficulties are outlined succinctly in a recent GTCE working document on global change and subsistence rangelands in southern Africa (Odada *et al.*, 1996);

> 'A major problem for research is that there is a considerable body of good work developing on the biophysical system in different areas, and also on social and policy issues, but there is poor integration between these disciplines..... Such integration is not achieved easily, because the disciplines have different approaches to research and even use or define words in different ways. It is very easy for researchers to intend to work together but in fact simply research different components of the system separately; that is, *interdisciplinary*, rather than just multi-disciplinary work is sought. There is a need for an integrated approach which concentrates on the areas of linkage between biophysical systems and social systems.'[3]

In the Ghana project our emphasis has been on interdisciplinary approaches to participatory research from the start. This has been simplified, to an extent, because for much of the project period only two disciplines have been involved: geography and crop science/agronomy. In each period of fieldwork (in four fieldwork periods over the fifteen month project) we have spent a substantial portion of time working in the field in pairs, with a geographer and an agronomist/crop scientist in each team.

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3. Italics as in the original. A presentation at the 1997 Development Studies Association conference provided specific evidence of the problems experienced in one Brazilian coastal zone project between natural and social science teams.

This has, in some respects, been a time-consuming approach, since the geographers would, at times, be involved in what might appear initially to be a purely agronomic issue, and vice versa. It became evident, however, at a fairly early stage, that we all gained much deeper insights into a range of issues by working together in the field: in undertaking interviews, in participating in or recording group discussion, in resource mapping, perambulations and transect walks and so on – and by following up interdisciplinary field work with interdisciplinary reflection.

Had we attempted to include more disciplines in each team it is possible that our work would have progressed less smoothly. Working in pairs seems to be ideal for participatory field work, since developing a rapport with local people is vital to the success of the work, and this is difficult when large groups of 'outsiders' come in to work together in a village context. Nonetheless, we see potential to extend the approach to incorporate additional disciplines in future work. The challenge would then be to achieve a balance between tight interdisciplinary team-work in small groups in the field and subsequent broad interdisciplinary analysis.

Updating and extending the database

One output of our current project in Ghana is a participatory database for selected settlements in the three survey districts. The database provides a wide range of information on local economies, resources and environment which, as villagers have known from the outset of the work, will be available for consultation by EPA, district administrations and NGOs which wish to develop projects in those districts. Hard copies of information for each settlement will be held by the village chief and other villagers who request a copy, by the DEMC chair, the district administration, EPA regional programme officers and EPA headquarters.

The hard copy provides only a snapshot study of work in 1997. Regular updating could, however, be done by communities – if they see such updating to be in their own interests - if copies of the Access database were available on computer at district headquarters and communities and district administrations collaborated in this work. It can be argued that for successful environmental management at district level – of the type DEMCs are presumably supposed to become involved in a decentralised administrative system – such information is crucial. Indeed, our database was designed in consultation with communities, DEMCs, district administrative officers and EPA Regional Programme Officers to provide the kind of local-level information they need for environmental management.

But is it realistic to envisage a situation where district administrations update the database at regular intervals (say every two years) on the basis of consultation with relevant communities? This raises a series of questions for debate, of which three are perhaps particularly critical:

a) hardware availability
b) staff capability
c) maintaining participation

a) Hardware availability

The importing of electronic data processing equipment into West Africa - including Ghana - has increased rapidly in the last decade.[4] In many government departments in Accra computers are widely in evidence (though use in many cases appears to be largely restricted to word processing). In the survey district PCs are not yet generally available, though the District Medical Officer for Health in Dangbe East (who chairs the committee which fulfils the DEMC functions) has two computers: a laptop supplied by the Rockefeller Foundation and a desktop PC supplied by his Ministry (for which he had to fight at regional level).

However, the situation in the districts could change rapidly. A number of bilateral and multilateral aid agencies with an interest in decentralisation are looking at ways to build capacity at district level. In particular, the World Bank's five year Village Infrastructure Project includes finance under its institutional strengthening element for 'equipment for training, office equipment.... installation and training for basic Management Information System (MIS) with District administrators' (IDA, 1997: 19). UNDP's recently approved Ghana 21 Capacity Programme aims at institutional and human resource development at district level, including data collection for planning purposes. This involves an examination of current district profiles for gaps and database development. A pilot project in eight districts includes two in the coastal zone. DANIDA also has a small pilot project currently running to support four districts with equipment and training. It is not unlikely, therefore, that PCs and training will be provided for district administrations in the near future.

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4. Bell (1996) cites an ITP Africa File Ltd survey in 1991 of electronic data-processing products imported to Africa (excluding South Africa). In West Africa there was a growth rate of imports of 65.6% between 1987 and 1989 (compared to an average of 21.9% for Africa as a whole).

b) Staff capability

Limited staff training would be required for the work involved in updating the database. The work is not complex and could be taught as part of a package with general word processing skills. There is a bigger question, however, regarding which staff would be involved. The DEMC members are not paid and the DEMC does not have funds to employ staff. The district administration would probably have to assign this work to the district planning departments.

Some District Assemblies have campaigned for EPA to provide staff at district level to assist the DEMCs but this will not happen in the prevailing circumstances in which EPA regional headquarters are themselves very inadequately funded (Porter and Young, 1997). This is unfortunate since experience in the Volta Region – where national service personnel were recruited by the EPA Regional Programme Officer to set up DEMCs – indicates that EPA employees based in the districts could do much to assist the struggling DEMCs in their activities (including database updating). In Keta district the national service graduate acted as secretary to the DEMC and made substantial efforts to assist the DEMC in establishing CECs. He achieved considerable success in a range of environment-related work during the short period of his stay in Keta. Sadly, neither the District Assembly nor the Regional EPA Programme Officer could find funds to extend his appointment after the expiry of his period of national service.

c) Maintaining participation

This is probably the most difficult element in the equation. Participatory work is time-consuming. It would be important to ensure that the updated database maintains its participatory integrity – that it does not merely cover factual information but continues to keep abreast of local debate and conflict regarding resource/environmental issues. Consequently, it would be necessary to establish a small panel representing diverse interests in each settlement for consultation during the updating work by district administrative staff. It would also be important to return hard copies of each update to the villages for comment and correction.

Work on the community-level database is very much at an experimental level. We have tried to make it as participatory as possible, in both design and content. Workshops (with a wide range of participants) will be held at the end of the project period in each of the three districts and in Accra to allow broad discussion of the material gathered to date and to consider how the database should be developed further. This will also provide an appropriate point at which to return final hard copies of the database to the villages surveyed.

A number of bilateral agencies (e.g. DANIDA) and NGOs (e.g. World Vision) are also collecting environmental and environment-related data in the coastal zone and have expressed interest in collaboration in this area. There is increasing recognition now among agencies in Ghana of the need for wider collaboration in data collection, in data sharing and in monitoring of change. Joint database development looks one promising way forward. Our survey has been limited to a selection of settlements in three districts. In order to take this pilot work to other settlements and other districts, substantial resources would need to be committed. However, a widely accessible database, available not only to local government departments and the EPA, but also to multilateral and bilateral agencies and the growing number of NGOs working in the coastal zone, could help to substantially reduce current tendencies to replication in data collection and avoid (inappropriate) actions being taken without reference to local conditions.

From participatory database to participatory GIS?

Another potential development of our work is to move from a participatory database to a participatory GIS.[5] GIS offers substantial opportunities for environmental management but has serious political and social implications which are insufficiently recognised. On the positive side 'it provides more powerful tools for local planning agencies; it offers exciting possibilities for data coordination, access, and exchange' (Pickles, 1995: 11), on the negative side its utilisation can be seen as 'technicist legitimation of the historical power relations associated with traditional developmentalism'. 'GIS empowers the powerful and disenfranchises the weak and not so powerful via the selective participation of groups and individuals' (Harris *et al.*, 1995: 196, 202). Participatory GIS aims to avoid the negative aspects of conventional GIS by incorporating community needs and specific social histories.

A participatory GIS for coastal Ghana would combine local knowledge of the type currently held in the database for the survey settlements with an array of conventional GIS information on environment and infrastructure. Through the integration of non-conventional behavioural and cognitive information - local knowledge - with conventional GIS information we should be able to avoid 'top-down' data creation which can

5. GIS is a contested term, but essentially involves some relational system of spatial information handling and representation.

disenfranchise those the GIS is supposed to assist. Recent work at Kiepersol in South Africa, linking GIS and local knowledge is particularly pertinent (Weiner *et al.*, 1995; Harris *et al.*, 1995) since it provides the only published accounts of a specifically participatory GIS in operation. Even so, the researchers acknowledge that the level of participation to date is not so great as they would wish (D. Weiner, pers. com.). Given the Ghanaian government's commitment to decentralised environmental management and popular participation, it would seem that work on the development of a participatory GIS which does not reinforce historical power relations but utilises local knowledge to the advantage of all – giving voice to the previously excluded – is an important and logical step forward in efforts to improve environmental management in Ghana. Discussions are currently in progress with EPA, the University of Ghana's Remote Sensing Applications Unit (whose remit now includes GIS) and individual researchers who were part of the Kiepersol project, on the potential for collaborative work in this field.

To conclude, the current Land/Water Interface project in Ghana is providing a range of insights into resource/environmental management issues in the coastal zone. By approaching the question of resource access, management and planning from a variety of angles – interdisciplinary, temporal, spatial and institutional – and with a firm emphasis on local participation, it gives a broad perspective on a very complex situation. It also offers substantial further challenges, notably through the extension of the database work to a fully developed participatory GIS.

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11
Financial Services for Renewable Natural Resources (RNR) Development in Ghana

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Introduction

Financial intermediation plays a critical role in the management and development of renewable natural resources (RNR). However, financial sector reform in Ghana, as elsewhere in sub-Saharan Africa, has not led to a significant expansion of formal financial services for the rural population (Nissanke, 1994). This paper reviews the impact of financial sector reform on the RNR sector and explores the relationship between financial intermediation and RNR management. Drawing on recent qualitative and quantitative data it examines the nature and characteristics of financial service provision and financial service needs in the RNR sector in Ghana.[1] Some options for change are explored, including lending to groups and linkages between formal and informal financial intermediaries, that would increase the supply of financial services to small scale operators in the RNR sector.

Financial sector reform and the impact on the provision of financial services to the RNR sector

During the 1980s the structural adjustment programmes introduced in many sub-Saharan African countries included financial sector reform

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packages which removed interest rate ceilings and quantitative controls on credit. Between 1971 and 1985, Ghanaian government policy attempted to allocate formal credit to priority sectors including agriculture and small business. The growth in bank branch networks ensured that coverage increased from 1.9 branches per 100,000 people in 1976 to 3.2 in 1984. However, these policies did not prevent either the decline in the proportion of total credit to these areas, or the continued lack of competitiveness of the formal financial sector, which was believed to be a cause of widening spreads between lending and deposit rates (Aryeetey, 1996). Credit ceilings were phased out by early 1988 and the agricultural credit target was removed in 1991. Interest rates were allowed to rise in line with inflation, and ceilings were removed in 1987.

In 1988 the Government of Ghana initiated the Financial Sector Adjustment Programme (FINSAP) as part of the Economic Recovery Programme (ERP) introduced in 1983. The Programme seeks to provide support particularly to the productive sectors and addresses the institutional and structural weaknesses of the financial sector. Under FINSAP the banking and financial services industry has been restructured through a number of policies and measures covering legislative, regulatory and financial issues, including the programmed divestiture of state-owned banks.

The Financial Institutions (Non-Banking) Law was passed in 1993 with the aim of fostering Non-Banking Financial Institutions (NBFIs) such as capital market, contractual savings and mortgage financing institutions to promote the growth of an efficient, competitive, well-regulated non-bank financial sector. Informal financial institutions registered as NBFIs include all credit unions affiliated to the Credit Union Association. Two savings and loans companies were registered in 1994, also straddling the formal and informal financial sectors. Except for the NBFI provision, FINSAP is wholly concerned with the formal banking system. The linkage in deposit mobilisation that already occurs between formal and informal banking sectors (Aryeetey, 1992) has had no formal recognition. For example, the Moneylenders Ordinance, which outlines regulations governing their activities but without investing enforcement powers in the banking authorities, remains unchanged. In 1997 a Non-Bank Financial Institutions Project has started to address problems hampering the delivery of financial services by Rural and Micro-finance Institutions (RMFIs), defined as organisations, groups, individuals or associations that collect savings or make loans in small amounts to farmers, micro-enterprises, traders or low-income households, whether or not formally registered with any authority. This includes the previously neglected non-Governmental organisations (NGOs).

Available data show that agricultural lending from commercial and secondary banks rose from ¢12,645 million in 1990 to ¢17,257 million in 1993, but as a proportion of total loans to all sectors of the economy it declined from 9.7% to 8.3% over the same period (ISSER, 1995). Total agricultural deposits were estimated at 12% (¢33 billion) of total formal sector savings against its contribution of 40% of GDP in 1993 (World Bank, 1994). The sector is therefore a net depositor having borrowed only ¢25 billion or US$26 million from the formal sector, if lending by rural banks and credit unions are included. Evidence of unmet credit needs exists: a 1988 study by the World Bank, cited in Reed *et al* (1994), estimated total demand for credit in the rural areas at US$136 million. Aryeetey (1996) notes the marginal increase in savings since the reforms: data on depositors for rural branches of the commercial and development banks and unit rural banks for the period 1989–91 show that annual increases in the average number of depositors per branch were small and for commercial and rural banks were matched by deposits mobilised, although average deposits continued to increase in 1991 for development banks despite a fall in the number of depositors. Most of these deposits are held in current and savings accounts. Thus, rural savings are still dominated by short term liabilities which are highly volatile. Savings held in banks vary directly with the availability of deposit-making facilities, and cost. Thus Northern Ghana, where there is one formal financial institution for every 100,000 clients compared to a ratio of 1:16–20,000 for the rest of the country, accounts for only 2.8% of total formal sector deposits (ISODEC, 1997). Currently the Bank of Ghana requires all rural and community banks to maintain a secondary reserve ratio of 52% of funds in Treasury Bills and its prudential guidelines require banks to obtain physical assets as collateral: these restrictions and problems with non-performing loans, have exacerbated high risk aversion and stifled lending to the RNR sector.

Financial sector reforms have had mixed results for the RNR sector overall. To some extent they have re-invigorated the failing formal financial institutions, and provided an enabling environment for non-bank financial institutions to emerge. However these same reforms have led to the significant withdrawal of services to the poor, especially those in the agricultural sector (ISODEC, 1997). Commercial banks have scaled back and portfolios are more concentrated and short-term profit oriented, especially in import-export financing. The Agricultural Development Bank now declares a profit but at the expense of the small scale food producing sector. This has left rural banks with the burden of filling the gap. But few advances have taken place in the way in which banks deal with small clients and in reducing their administrative costs, except for group finance schemes. The result has been the continued exclusion of small scale operators in the

RNR sector from formal financial services: it is likely that women, who despite their central role in the RNR sector, have consistently more restricted access to resources and factors of production than men, are disproportionately excluded from financial services in Ghana (Bortei-Doku Aryeetey and Aryeetey, 1996; Holt and Ribe, 1991). Women are less likely than men to own collateral or to be literate, their household and childcare duties may limit the distance they can travel to a bank and the time available for such activities. The amounts they may wish to deposit, obtained from small scale informal sector activities, may be too small to open an account. Women have little direct involvement in commercial and formal sector activities; agricultural loans, when given, are usually made available to cash crop farmers: women represent fewer than a fifth of cocoa growers. According to Bortei-Doku, Aryeetey and Aryeetey (op.cit.), although banks do not keep gender disaggregated data in Ghana, the nature of their operations is such that women are less involved in saving and borrowing through banks than men. Research findings discussed below corroborate this to some extent, with the caveat that women's involvement in processing and marketing may make them more attractive to banks than primary producers.

The role of the informal sector is, by inference and evidence, considerable: for example the cocoa crop generates ¢175 billion per annum, yet only a small proportion of this is channelled into the formal financial system. People also save by investing in non-liquid assets. Credit unions have mobilised over ¢2 billion and pay no interest on the deposits (Reed *et al, op. cit.*). It is estimated by the World Bank (1994) that 45% of all private sector financial savings are mobilised initially through informal channels whilst Aryeetey and Gockel (1991) suggest the figure is at least 55%. Informal financial intermediaries such as susu collectors are utilised to satisfy savings needs even when the client must forfeit a small percentage of his/her savings as a fee for the service whilst receiving no interest on the deposit (Reed *et al*, op.cit.).[2]

2. *Susu* is a term used in Ghana and elsewhere in West Africa to describe a rotating savings and credit association (ROSCA). A *susu* collector is an informal, usually mobile, savings collector who collects fixed amounts daily, or at regular intervals, from clients. At the end of the month the savings are returned to the depositor minus one day's deposit as commission to the *susu* collector.

The contribution of the RNR sector to the Ghanaian economy

Approximately 80% of poor households live in rural areas where 77% are engaged in agriculture and 84% are self-employed (ADB, 1994). Female-headed households constitute around 30% of the total in rural areas. Thus, the vast majority of rural dwellers depend on the RNR sector for their livelihoods, and it plays a crucial role in the economy, although its share of 40% of GDP in the period 1993–6 represents a decline from its share of over 50% in 1983–6 (1975 prices, World Bank, 1995) and on the whole there has been a continued decline in its contribution to other major economic indicators, such as tax revenue and foreign exchange earnings. Shares of the various agricultural sub-sectors within the total RNR economy have remained fairly static over the period 1990–5, with crops/livestock contributing 70.4%, cocoa 14.6%, forestry/logging 11.4% and fishing 3.6% in 1995 (ISSER, 1996). The decline in the relative contribution of the RNR sector to the national GDP has been attributed, *inter alia*, to the high cost of inputs especially fertiliser prices, poor farmgate sales and inadequate storage and processing facilities. Food production has not increased markedly in the last five years in terms of output, area cultivated or yield, and therefore food prices have consistently risen over the past decade, often outstripping non-food inflation. Poor agricultural performance is thus seen to be a major contributing factor to high inflation, declining economic growth and inadequate food security – with demand exceeding supply as population growth normally outpaces agricultural growth (ODA, 1995). As poverty is predominantly a rural phenomenon in Ghana and farm-based self-employment the most important source of income – although recent estimates indicate that at least 40% of rural dwellers earn some income from non-agricultural informal sector activities (ISSER, 1995) – it follows that in any attempts to raise the population out of poverty, enhancing the productivity of the RNR sector should be a priority. This calls for the application of innovative technology and management practices without compromising the resource base. A necessary, although not sufficient, condition is the expansion of financial intermediation in the RNR sector.

Financial service needs of clients in the RNR sector

Clients are defined as small scale operators engaged in agriculture, animal husbandry, fishing and forestry activities or a combination of these, including primary production and capture, processing and marketing. The use of the word 'client' does not imply only those people accessing formal

financial institutions. It is employed on the assumption that everyone uses 'financial services' at some point, even if these are confined to exchanges between family members or investment in non-financial forms. Johnson and Rogaly (1997:1–2) describe the two principal forms of financial services as 'those that build up cash reserves through forgoing income' (such as savings, insurance and loans) and those which 'allow assets to be converted into and out of lump sums of cash' (including mortgages and pawns). Remittance transfers and other cash-handling services constitute a third type of financial service, often required by migrants.

Financial service needs are the requirements (met and unmet, expressed or inferred) for these financial services. The variation in nature and scale of financial service needs indicates a demand for a range of financial products, as well as associated mechanisms which make the products accessible and attractive to clients. Related non-financial service needs include the provision of training or capacity-building for clients, individually or in groups, to utilise these services effectively. This includes training which is directly aimed at enabling clients to apply for and manage credit and other financial products, and training in business, entrepreneurial, marketing and technical skills to ensure a return to capital and to enhance the sustainability and profitability of RNR-related activities.

Factors influencing financial service needs in the RNR sector

Financial service needs are derived from real or material needs: these are a function of the livelihood systems which individuals, households and communities construct within their resource environment to satisfy their basic needs, including subsistence and income-earning or income-substituting activities. They are also influenced by socio-cultural, religious and political considerations which impose certain obligations, both regular and periodic, to be met by individuals, households and communities. At the broadest level this entails taking into account the context in which smallholder farmers and artisanal fishermen, traders and processors live and operate: the socio-cultural milieu and resource environment – both natural and manmade elements – and the availability of information, skills, goods and services.

Access to, preferences for, and take up of financial services are shaped by individuals', groups' and communities' history and perceptions of financial services provision. This experience is directly related to the nature and availability of financial service provision. Knowledge, attitudes, beliefs and practices concerning financial services vary according to the socio-economic characteristics of the client, including age, gender, seniority, marital and

parental status, membership of groups, occupation and ethnicity.

Livelihood systems are heavily influenced by the RNR subsector(s) in which a person or group predominantly operates, the scale and technological level of the enterprises undertaken, as well as by claims over, access to and ownership of factors of production, stores and resources (both material and intangible). However rural people draw on several sources of support and maintain a portfolio of activities, partly to smooth out the seasonal peaks and troughs of agricultural production, partly to reduce dependence on one crop or enterprise, thereby reducing risks. Chambers (1997) suggests that this complexity and diversity can be illustrated in six dimensions which are inter-related and include: the use of different skills by an individual; different members of households engaged in a variety of activities; a multiplicity of on and off-farm enterprises; social capital formed by social relationships that can be drawn on including access to credit in cash or kind; seasonality, which extends beyond the obvious farming cycle, and relates to health, rites of passage, social occasions and obligations, food availability, levels of expenditure, income, debt and savings; and finally interlinkages: these refer to the synergies and sequencing of enterprises and activities into not only a farming system, but a livelihood system. Interlinkages and seasonality combined can help to secure the livelihoods of a whole community as, for example, with coastal fishing communities in Ghana where the fishermen earn the highest income when fish processors have the highest outlay and vice-versa, and where the lean fishing season coincides with the time for preparing land for the major season crop.

The role of financial intermediation in the RNR sector

Findings from three locations in Southern Ghana: Winneba, Sunyani and Yeji, where, respectively, coastal fishing, agriculture and forestry, and inland fishing predominate, suggest that the financial sector interacts with the RNR sector in a number of inter-related ways:

- lending to small-scale primary producers in the RNR sector for capital investment (land, soil conservation, livestock, tools, machinery, fishing boats, nets and engines) and working capital to purchase inputs (labour, agro-chemicals, planting materials);
- lending to individuals and enterprises which purchase, process and market RNR products (who in turn may on-lend to primary producers through pre-financing arrangements);
- lending to input suppliers (of tools, agro-chemicals, fishing gear etc.)

who may also on-lend through pre-financing arrangements and supply inputs on credit;

- provision of savings facilities for depositing excess liquidity and profits and against which future loans may be made;
- provision of additional financial services which support RNR development such as crop insurance, inventory credit and export guarantees; and indirectly,
- lending for consumption activities and consumer durables and housing which constitute an investment in RNR livelihoods by enhancing the human resource capacity available;
- lending to non-RNR activities for employment creation and growth, and fuelling an increased demand for RNR products through increased incomes and greater purchasing power;
- lending for infrastructure that contributes to improved RNR management (roads, markets, storage facilities).

Seasonality and duration of economic activities are key issues for loan making, deposit mobilisation and loan recovery. Specific periods can be identified for many groups when credit provision must be timely or it can end up costing the loanee more because of the money to repay and the missed economic opportunity. Conversely, in the case of fishermen for example, premature loans for boats or engines or nets might mean that they would have to start paying interest on an as yet unproductive asset.

In Yeji, boat builders and repairers, fishing gear sellers and fishermen are likely to need loans for their main economic activities in the early part of the year, especially March to April when new stock or capital items have to be bought and incomes are low. Fish traders are more likely to require credit during the peak fishing season, June to October in order to buy fish for cash from fishermen with whom they do not have a reciprocal arrangement. Fish processors need money from September to December when incomes are low because of the glut of fresh fish and they are at their busiest processing but not selling very much. Salt sellers would probably suffer from liquidity constraints between November and January before sales pick up.

The pattern of financial service needs is similar for the coastal fishing communities: for fishermen owners the time of lowest income, February to April coincides or slightly precedes the time when they need to re-equip their boats, or for crew members, when all outgoings are likely to exceed income. Fish processors need access to credit throughout the main fishing season but particularly during the bumper catch (May– July) when they require quantities of inputs such as fuel, labour and when they need to maximise production in order to be assured of a good income later in the year.

In all cases there is a distinction to be made between the relatively short term requirements of recurrent inputs and expenditures and the capital investment requirements associated with lumpy items ranging from canoes to smoke ovens. The scope for increased productivity of traders and fishermen is limited unless they acquire the capital to move into a different scale of operation (crew in the Winneba area reported that they would make deposits with a bank if an appropriate service was available and that lack of formal savings is a constraint to starting their own business) whereas owners and processors may wish to expand their existing enterprise. In the Winneba area processors reported needing assistance to be in a position to buy more fish in the peak season (business expansion loans) and metal gauze trays to improve the efficiency of their operations and quality of their product.

Sources of credit and savings and the role of the informal financial sector

It appears that the financial service needs of the majority of clients in the RNR sector are being met through informal arrangements with other people in the community, most of whom are not professional financial agents. For example primary production-related needs such as crop finance, capital investment in fishing tackle or livestock purchase are met through pre-financing arrangements, reciprocal labour exchange, provision of labour on credit, buyers' and suppliers' credit, to a much greater extent than loans from moneylenders, Credit Unions, and NGOs (to groups). Stock acquisition needs for petty trading/marketing are met by other traders, advances from susu collectors, traders' own savings and suppliers' credit. Agricultural produce traders may also buy stock from the farmgate and pay the farmer back after making sales. Storage and processing financial service needs are more often met by NGOs and Credit Unions.

Social and consumption expenditure is met in different ways, depending on whether the outgoings are predictable or unpredictable, planned or unplanned, lumpy or regular expenditure. Sources include savings, loans from moneylenders, retailer credit, community based self-help groups e.g. for funerals, and festivals, and payouts from rotating savings and credit associations (ROSCAs). Membership of and financial contributions to such groups therefore constitute a kind of insurance policy. Health (usually unplanned, but with a seasonal element) and education expenses (falling at regular intervals throughout the year) are met through savings, borrowing from friends, relatives, moneylenders. In emergencies relating to productive assets such as crops, livestock, capital equipment (fire, theft, breakdown, drought, pests, disease) as well as to illness or death in the family, people

turn to friends, relatives, and moneylenders whose loan is often guaranteed by a respected member of the community.

Deposit facilities are provided by rural and agricultural development banks (usually to men), susu collectors (for market women and traders) and by membership of ROSCAs. Cash is often kept at home or on the person. Non-financial savings include building materials and cloth. Savings are needed for a range of reasons: for collateral purposes; to gain access to loans, training and support, and membership of a group; for emergencies, for the physical security deposit facilities provide; to instil the habit of saving; to resist obligations to family, friends; to build up capital for later investment; to build up for regular lump sum payments e.g. school fees.

Sources of finance used over the RNR enterprise life-cycle indicate that the stage (and scale) of the sectoral activity in which an individual or group is engaged is an important determinant of the sources of credit preferred, accessible and used, and to a lesser extent, of deposit-making methods. More informal sources of credit (for example, friends and relatives in the same business) are preferred for obtaining start up capital before small scale operators have been able to save, or have established the business credentials necessary to borrow from financial intermediaries who do not know them personally. Working capital is obtained in various ways, depending on how pressing the need is: from moneylenders (usually those for whom moneylending is not the main source of income), friends, relatives including spouses, own profits and proceeds and suppliers' credit. For example, fishmongers and processors take fish on credit from fishwives who control the sale and distribution of fish from boats, although there are indications that these transactions may be exploitative since the fishwives hold monopolistic positions and may 'compel' other women to take credit. Fish traders and processors also employ other women to labour for them for deferred payment. Gari processors might buy cassava on credit from farmers to be repaid after marketing. To expand businesses small scale operators are usually in a better position to go to professional informal financial agents since they have an established enterprise or source of income, and will own capital items suitable for collateral; or to the formal sector, where they may have built up savings. However farmers tend to expand by bringing more land under cultivation through a share-cropping arrangement (which requires labour inputs to clear and prepare the land, and possibly the hiring of a tractor or other machinery if appropriate) or increasing the productivity of land already under cultivation through the application of improved practices and inputs.

Those clients with substantial capital assets (land, boats etc.) tend to use the widest variety of credit sources and almost always save with banks. Those groups who have formed some sort of association (tomato growers

or fish processors) are more likely to have accessed donor or government funding than those who have not. The more socially (cf. economically) defined the relationship between debtor and creditor the more likely that terms will be relaxed i.e. no collateral required or low/non-existent interest rate, but in some respects there is a greater onus on the borrower to repay lenders from within the community, in order not to bring dishonour on the loan guarantor. The speed and the broader collateral requirements of informal sector are highly attractive to the small scale operator in the RNR sector. Social pressure to repay is thought to be effective, and a guarantee of access to future loans.

Existing economic, financial and social inter-relationships between actors or types of enterprise in an RNR sector constitute a complex and dynamic system. Changes in activities and inputs, costs and product prices in one enterprise are likely therefore to have an impact on others. For inland and coastal fishing communities, as well as farming communities to some extent, different sets of operators (such as traders and primary producers) alternate in the role of creditor and debtor depending on the season and stage in the operator's or enterprise's life-cycle. These arrangements constitute a large part of the local financial intermediation, in addition to professional intermediaries and institutions who are third parties to the enterprises.

Financial service provision for RNR

Interviews with formal, semi-formal and informal financial intermediaries in the three locations identified their respective perceptions of lending to the RNR sector, their involvement in group lending schemes (for banks), and linkages with other financial agents. To determine lending preferences and factors affecting these, officials and operators of different financial intermediaries were first asked to rank order lending preferences between the RNR sector and non-RNR sectors, and then to rank order lending preferences *within* the three RNR sub-sectors (agriculture, fishing and forestry). Secondary data on bank lending portfolios supplemented the qualitative findings.

Lending preferences between RNR and non-RNR sectors

Although it was expected that the banks might shy away from lending to the RNR sector, it is clear that loans for agriculture and fishing are rarely the first lending preferences for *both* the formal (banks) and informal financial

agents (susu collectors, moneylenders). Except for one NGO, forestry was never the first lending preference.

For the banks inter-sectoral lending preferences are influenced by bank remit, availability of donor funds, transaction costs, risk, marketing prospects, repayment rates, and predominant livelihood activities in the area. Susu collectors are also influenced by similar considerations (cultivation period, turnover, livelihood activities in the area, repayment rates) as are the moneylenders (capital requirements, repayment rates, personal experience of particular RNR activities).

Of all the banks only the Agricultural Development Banks (ADBs), largely because of bank remit, ranked agriculture as their first lending preference, but even here one of the managers emphasised his bank could not survive on agricultural loans alone. In contrast, the Rural Banks gave a lower ranking for lending to agriculture: second in Sunyani and Techiman, and last of all in the Winneba and Yeji research areas. The informal financial intermediaries also expressed strong reservations concerning lending to agriculture. Only one of the susu businesses ranked agriculture first, though this was a susu union in the Winneba area with members engaged in agricultural activities. Similarly, only the one moneylender interviewed in the Sunyani area ranked lending to agriculture first, two others ranked this sector second, while the remaining moneylenders ranked steered clear of this sector altogether. Neither of the two credit unions in the coastal fishing area advanced loans for agriculture, while the credit union in Sunyani ranked this sector second. In marked contrast, the two NGOs interviewed in Sunyani, World Vision International and Adventist Development and Relief Association (ADRA), did rank lending to agriculture first (in the case of ADRA with forestry), reflecting the community and environmental concerns as well as the development motives of these two organisations.

Perceptions of lending to the fishing sector are rather more positive than for agriculture. In particular, the Rural Banks tend to regard fishing more favourably (in Winneba and Yeji it ranked highly and above agriculture) compared to the ADBs in these two areas ranked fishing low due to risk. The informal financial intermediaries in Winneba and Yeji also have a comparatively positive attitude towards lending to fishing: in Winneba three of the four susu collectors ranked fishing either first or second, and similarly for the two susu collectors in Yeji. All five moneylenders in Yeji ranked loans for the fishing sector first, while this sector was ranked second and third respectively by two of the three moneylenders in Winneba. Although the National Investment Bank (NIB) in Sunyani indicated that loans to the fishing sector are a priority, the significance of this needs to be examined by reference to lending preferences *within* the sector (see below). This is also the case for loans for forestry, in the case of the development banks (ADBs, NIB

and the Bank for Housing and Construction (BHC)) in the Sunyani area that provide loans to this sector.

Two questions emerge from the sectoral lending preferences. First, if loans for agriculture, fishing and forestry are not the first sectoral lending preferences for almost all the informal, semi-formal and informal financial intermediaries interviewed, then what is the most popular lending preference? Second, if *both* formal and informal lending agents are reluctant to lend to the RNR sector, where do small scale operators in this sector obtain loans from?

Although not a loan purpose as such, credit provided to salaried workers is the most popular lending preference for many of the intermediaries. The Rural Banks in all three areas gave these loans as their first lending preference because of the low risk and low costs of recovery. For the same reasons, an ADB manager which ranked these loans third said ideally he would like to extend all his credit facility to salaried workers. Perceptions of low risk and easy recovery also lead the moneylenders to advance loans to salaried workers for school fees, rent arrears, and rent advances. Like the moneylenders, the susu collectors reported increases in such advances due to the more difficult economic climate.

The answer to the question of where small scale operators in the RNR sector obtain loans can be inferred: the fact that susu collectors and moneylenders express similar reservations to the banks in lending to the RNR sector suggests that small scale operators in this sector obtain finance from other types of informal lending agents. Ashiley (1986) cited in Aryeetey (1994) notes the importance of supplier credit and advance payment by middlemen. This is supported by the previous analysis of financial service needs which, *inter alia*, shows that pre-financing of crop cultivation and fish catch by traders and input suppliers is a major source of funds for primary production and capture.

Quantitative data from the banks' lending records emphasise the importance attached to provision of personal loans, even for the ADBs. For example, one ADB that had ranked agriculture as their first lending preference advanced 38% of loans (by value) to this sector, whilst 26% went to commerce and 37% for personal loans during 1995. In terms of the number of loans the figures are particularly striking with 1776 (92%) loans advanced for personal use and just 105 (5.5%) loans disbursed for agriculture in the same period. For another ADB personal loans accounted for 72% and agriculture 34% of loans disbursed (by number) over a six month period. The banks' data on repayment rates clearly demonstrate the low risk nature of personal loans compared to higher risk agricultural loans. The first ADB has a repayment rate of 93% for personal loans compared to 60% for food crop loans, while the second ADB quotes a repayment rate of

99% for the former compared to just 42% for loans guaranteed by the International Fund for Agricultural Development (IFAD) and 51% for other general agriculture loans.

Lending preferences within the RNR sub-sectors

The analysis of sectoral lending preferences provides only half the story with respect to financial service provision to the RNR sector. What is also needed are lending preferences *within* each of the agriculture, fishing and forestry sectors to determine the level of support to small scale operators for these particular livelihood activities. From this second level of analysis it is clear that even where both formal and informal lending agents are providing credit to the RNR sector, these lending agents show a preference for funding less risky and shorter duration processing activities and trade rather than primary production and fish catch. This is particularly the case for the fishing and forestry sectors.

Lending preferences *within* the fishing sector are affected by such factors as risk, capital requirements, repayment rates, gender of operators, and numbers of people benefiting from the funded activity. In the coastal fishing area of Winneba one Rural Bank manager favoured fish processing and smoking rather than fish catch, as the former activities are conducted by women who in his opinion are better repayers than men. In the same area one susu collector preferred to provide advances to local fish sellers (easily accessible) rather than fish smokers (processing can delay repayment) and fishermen (uncertainty of catch). Similarly for inland fishing, the banks, a susu collector and three of the five moneylenders providing loans to the fishing sector, preferred financing marketing and/or processing rather than fish capture. In Sunyani, only two of the banks interviewed (ADB, NIB) provide loans to the fishing sector, but here the loans are for large-scale cold storage facilities: loans for fish farming had been discontinued because of loan diversion and poor repayment. In the Winneba area, moneylender perceptions of the fishing sector are also guided by markets and risk, with one of the moneylenders preferring to lend to women fish traders in Kumasi and inland fishermen in Yeji, rather than to local coastal fishermen in Winneba.

The inter-sectoral analysis of lending preferences showed support for the forestry sector confined to some of the banks in the vicinity of Sunyani (ADB, NIB, BHC) and Winneba (Rural Bank). However, intra-sectoral analysis of lending preferences show that the banks support large scale milling and plywood manufacture and not smallholder forest livelihood activities. For the banks lending preferences *within* the agriculture sector are

affected by such factors as remit of bank, local resources, input requirements, length of cultivation period, yields, storage characteristics, post-harvest losses, markets, characters of producers, feasibility of monitoring, and repayment methods and rates. Credit for poultry farming is a popular lending preference for a number of the banks because of government support, the popularity of this activity, ease of monitoring and good repayment. Otherwise the banks' ranking within the agriculture sector is rather variable, even with respect to the same kind of bank within the same region. For example one ADB ranked agricultural lending as follows with reasons given in parentheses: maize (quick maturing, high yields, minimum post-harvest losses, ease of storage), cassava (export orders for chips), vegetables (perishable, need irrigation to expand), while a nearby ADB's rank order was: cocoa (easy repayment through cocoa cheques), poultry (can be monitored), maize (high production costs), yam (farmers prefer to keep the proceeds until the next season) and lastly vegetables (perishable). In contrast, the Rural Banks in the Sunyani area put vegetables first (short cultivation period, good repayment, good growers) and maize second (most farmers grow it, repayment within six months).

Banks and systems of group finance: one option for change

Given banks' perceptions of high transaction costs and high risks, the only way for small scale operators to acquire formal finance for RNR livelihood activities is through systems of group finance. The rationale for linking banks to groups of borrowers derives from risk reduction (through joint liability arrangements) and cost reduction (through economies of scale and transfer of costs) leading to more sustainable and equity focused financial services. Such schemes are felt to be particularly important for those such as small scale farmers without access to traditional forms of collateral.

The four ADBs in the study areas provided financial services to an extensive range of groups in the agriculture and fishing sectors: a total of 91 groups, 312 groups, 350 and 265 groups respectively. However, the experiences of group finance are very mixed. In one ADB the 350 IFAD supported groups were described as functioning but only in the sense of being indebted to the bank. In another ADB only 40 of the 207 IFAD supported groups were described as working well, while just half of the 56 groups supported by the project Global 2000 were described as OK. For both banks a crucial factor seems to be how effectively NGOs perform their intermediary role between the banks and the groups, and one of the banks noted that had pre-existing rather than purposively selected groups been used the experience would have been more positive. Other factors associated

with the better functioning of groups appear to be types of activity engaged in (e.g. marketing rather than cultivation and fish catch), and gender composition. Sometimes these two factors work in combination: marketing groups composed of women traders are felt to work particularly well.

However, bank requirements for group formation and structure can affect the dynamics of the group. This is particularly evident with women's groups where bank requirements may necessitate the inclusion of a literate male contact person on the executive. In one case, discussions with one women's group were almost entirely monopolised by the male 'secretary' present.

A second option for change: strengthening linkages between the formal and informal financial sectors

To secure greater accessibility to financial services on the part of small scale operators in the RNR sector, a further policy option is to develop and strengthen linkages between formal, semi-formal and informal financial intermediaries to take advantage of the latter's lower transaction costs, flexibility, accessibility, knowledge of local conditions, and social sanctions (Bolnick, 1992). To consider the scope for this policy option, existing linkages between financial intermediaries were identified, along with the financial intermediaries' perceptions of the benefits and disadvantages of linkages to other financial agents.

Existing linkages between the formal and informal financial sectors

Interviews with financial intermediaries in the three areas show an extensive network of existing linkages with respect to loan provision and deposit arrangements (Table 1). For the banks, the main linkages to the semi-formal and informal financial intermediaries are in the form of holding of deposits and the provision of loans, particularly for cooperatives in the semi-formal sector, and for traders and merchants in the informal sector. NGO linkages to financial intermediaries are of two main kinds: deposits held with banks, and loans channelled to clients through credit unions, while the credit unions had taken loans from international NGOs, hold deposits in banks, and hold deposits/savings from traders who are members. All the informal financial intermediaries, with the possible exception of the ROSCA which disburses savings to members immediately, use banks for the safekeeping of deposits. In turn, it is also common for the susu collectors to provide savings facilities for traders and merchants, and in Yeji to the traders who

Table 1: Linkages between Financial Intermediaries in the Winneba, Sunyani/Techiman, and Yeji areas.

Financial Intermediaries		**Types of Linkages to Other Financial Intermediaries**			
		Take loans from	Hold deposits with	Take savings from or for	Provide loans to
Formal	Banks	Banks Multilateral Agencies	Banks	Banks NGOs Credit Unions Co-operatives Susu collectors Traders Money-lenders Other groups	NGOs Co-operatives Credit Unions Susu collectors Traders Money-lenders Other groups
Semi-Formal	NGOs	–	Banks	–	Credit Unions
	Credit Unions	International NGOs	Banks	Traders	–
Informal	Susu Collectors	Banks Susu Collectors Family	Banks	Traders Trader/Money-lenders	Traders Trader/ Money-lenders Fishing Boat Owners
	Money-lenders	Banks Traders	Banks	–	Traders Trader/ Money-lenders Susu Collectors Money-lenders
	Trader/ Money-lenders	Banks Traders Money-lenders	Banks	–	Traders Trader/ Money-lenders

also act as moneylenders. A few of the moneylenders reported taking loans from banks and they variously provide loans to traders, in one case to another moneylender, to trader moneylenders, and susu collectors. None of the moneylenders provide savings facilities.

Perceived benefits and disadvantages of linkages between financial intermediaries

With increasing attention focused on the potential for creating and expanding linkages between formal, semi-formal and informal financial intermediaries, for policy formation it is important to determine how the intermediaries themselves perceive the benefits as well as the disadvantages of present and future associations.

Banks

The banks perceive the advantages of linkages to semi-formal financial intermediaries as mainly two-fold: (i) increased and less costly deposit mobilisation, and (ii) less costly loan disbursement and better repayment rates. However, such linkages are not problem free. The responsibilities of some NGOs are limited to group formation leaving the banks to deal with any subsequent problems, and political affiliations of certain NGOs can adversely affect group relations with the banks. The disadvantages of links to groups of borrowers (other groups in Table 1) are also apparent: badly organised groups, ineffective group executives, disruption of groups by defaulters and hijacking of groups to secure common property.

The advantages of bank linkages to informal financial intermediaries were also expressed in terms of increased deposit mobilisation, with emphasis placed on the help from merchants and traders in times of cash shortages for the banks. However, the disadvantages associated with these links suggest a stronger ambivalence towards the informal financial intermediaries, particularly towards the susu collectors and the moneylenders. In addition to issues of integrity, problems of collateral for loan requests and one example of default, disadvantages of linkages to susu collectors also include the forming of barriers between banks and their customers, and bank assistance to what are felt to be competitors. This last point is also evident with respect to moneylenders.

Semi-formal financial intermediaries

Only one of the two NGOs interviewed expressed a view on linkages and this was with respect to links with Credit Unions. In this case the benefits were felt to be more effective and less costly screening and monitoring of loans, and better repayment rates. The main disadvantage was felt to be slowness in loan disbursement due to credit union rules for granting loans. As with other non-bank financial intermediaries the credit unions thought benefits with bank linkages were mainly through safety of deposits and possible provision of loans, while the disadvantages were the high interest rates charged on bank loans and that the banks were seen as competitors for the credit unions. The only other type of linkage mentioned by the credit unions were those with susu collectors, where the benefits were seen in terms of increased deposit mobilisation and it was noted in some cases that susu collectors are attached to credit unions as commission agents.

Informal financial intermediaries

For the susu collectors the benefits of bank linkages are security of deposits and in their case instant withdrawal facilities from current accounts, although the need for bank loans was also stressed to facilitate on-lending to traders and merchants. However, disadvantages of links to banks were also expressed: rural banks can collapse, there may be possible delays in making deposits and withdrawing funds, and banks can be reluctant to take the small denomination and dirty notes normally collected by the susu collectors.

Conclusion

Although 80 per cent of households in Ghana live in rural areas and the RNR sector accounts for 40% of GDP, there has been a decline in the proportion of bank credit for agricultural purposes and small scale operators in the RNR sector continue to be largely excluded by the formal financial sector. With the exception of the ADBs the analysis of lending preferences shows the banks reluctant to finance high cost and high risk RNR livelihood activities, and instead favouring low cost and low risk loans to salaried workers. Even where banks do lend to the RNR sector, *intra-sectoral* lending preferences are for funding less risky and shorter duration processing activities and trade rather than primary production and fish catch.

In contrast the examination of RNR clients' financial service needs shows the role of the informal financial sector is considerable both in terms of small scale deposit mobilisation and loan provision. There is a complex and variable interaction between financial service providers and the RNR sector. Financial service needs are affected by particular livelihood systems and different stages in enterprise development, socio-cultural factors and religious and political considerations. Access and preferences for different financial agents are influenced by history and perceptions of financial service provision. The speed, flexibility, broader collateral requirements of informal financial agents are attractive to clients in the RNR sector. Systems of group finance and developing linkages between formal and informal financial intermediaries are two policy options that build upon the inherent advantages of the informal agents.

However, the experience of group finance is very variable and is no guarantee of risk and cost reduction for the banks, or of securing more equitable access to formal financial services for clients in the RNR sector. Aryeetey interprets the policy of group finance as 'an incomplete incorporation of informal ideals' which demonstrates the difficulties of adopting informal strategies and operational principles within a formal institutional framework (Aryeetey, 1996: 31). More research is needed on the functioning of groups and their interface with banks and NGOs, and assessment of the relative advantages and disadvantages of schemes involving pre-existing and purposively selected groups.

The analysis of clients' financial service needs and financial service provision for RNR activities indicates the potential but also the difficulties of the second policy option, that of linking the formal and informal financial agents. The complexity of financial service needs of clients who are wholly or largely dependent on RNR management for their livelihoods, is reflected by the variety of mainly informal arrangements that have emerged to meet them. To date, the focus of linkage policy in Ghana has been on establishing and developing links between the banks and susu collectors. However, clients in the RNR sector use a diverse array of professional and non-professional informal agents, and the many existing linkages between formal, semi-formal and informal financial intermediaries also demonstrate the potential for a broader range of linkage mechanisms than that of bank and susu collector collaboration.

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ODI Research Studies

Natural Resource Management in Ghana and its Socio-economic Context

Roger Blench (ed.)

Ghana is one of the better-researched West African countries in terms of natural resource management. A long period of stability has encouraged substantial investment from bilateral and multilateral development agencies, while numerous NGOs operate in the semi-arid North. The present book emerged from a conference and DFID-sponsored workshop entitled 'Partnerships and Policies for Improved Natural Resource Management' held in London in June 1997. The emerging theme was the exploration of a diversity of strategies for more effective community participation in managing the environment. The focus is on the region north of the forest but the coastal zone is also included. The evolution of agriculture during this century is a central topic, and the papers tackle the vexed question of static or declining productivity and chronic food deficits. Others examine more general institutional issues, such as training colleges, local financial institutions and the role of hi-tech approaches such as the use of GIS in resource management.

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